RECORD OF DECISION

Riverside Industrial Park Superfund Site
EPA ID# NJSFN0204232

Operable Unit One

Newark, Essex County, New Jersey

United States Environmental Protection Agency
Region 2
New York, New York
September 2021

DECLARATION STATEMENT

RECORD OF DECISION

SITE NAME AND LOCATION

Riverside Industrial Park Superfund Site (EPA ID# NJSFN0204232)
Newark, Essex County, New Jersey
Operable Unit 1 – Entire Site

STATEMENT OF BASIS AND PURPOSE

This Record of Decision (ROD) documents the U.S. Environmental Protection Agency's (EPA's) selection of a remedy for Operable Unit 1 (OU1) of the Riverside Industrial Park Superfund Site (Site or Riverside Industrial Park), in Newark, Essex County, New Jersey, which addresses contaminated sewer water, soil gas, soil/fill material, and groundwater. The selected remedy also addresses various wastes found across the Site. OU1 includes the entire Site and this remedy is expected to be the final action for the Site. The remedy was chosen in accordance with the requirements of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended, 42 U.S.C. §§ 9601-9675, and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), 40 C.F.R. Part 300. This decision document explains the factual and legal basis for selecting the remedy. The attached index (see Appendix III) identifies the items that comprise the administrative record upon which the selected remedy is based.

The New Jersey Department of Environmental Protection (NJDEP) was consulted, in accordance with Section 121(f) of CERCLA, 42 U.S.C. § 9621(f). NJDEP concurs with EPA's selection of Waste Alternative 2, Sewer Water Alternative 2, Soil/Fill Alternative 4, and Groundwater Alternative 4. NJDEP does not concur with EPA's selection of Soil Gas Alternative 2 (see Appendix IV).

SITE ASSESSMENT

Actual or threatened releases of hazardous substances from the Site, if not addressed by the implementation of the response action selected in this ROD, may present an imminent and substantial endangerment to public health and welfare and to the environment.

DESCRIPTION OF SELECTED REMEDY

The selected remedy addresses five media which include: waste material, sewer water, soil gas, soil/fill material, and groundwater. Lead was found to be the primary contaminant of concern (COC) in soils at the Site. In addition to lead, copper, arsenic, polychlorinated biphenyls (PCBs), volatile organic contaminants (VOCs), and semi-volatile organic contaminants (SVOCs) were found to be of concern in soils. Lead, VOCs, and SVOCs were found to be contaminants of concern for groundwater. VOCs were found to be COCs for soil gas. VOCs were also found to be a contaminant of concern in the settled solids in an inactive sewer manhole. Non-aqueous phase liquid (NAPL) and various other wastes containing hazardous constituents were found across the Site. The various other wastes are currently contained; however, there is potential for contaminants to be released into the environment.

The major components of the selected remedy are:

Waste Alternative 2 - Removal and Off-Site Disposal

- Removal and off-site disposal of the underground storage tanks (USTs), the aqueous and solid waste and/or light non-aqueous phase liquid (LNAPL) within the USTs, non-aqueous phase liquid (NAPL)-impacted soil/fill material surrounding the USTs, the LNAPL in the pooled water in Building #15A, the white chalky talc-looking substance in a hopper in Building #7, a plastic 55-gallon drum in Building #12 containing liquid waste, and a five-gallon bucket in Building #17 containing solid waste. The LNAPLs in the UST and in Building #15A are considered principal threat wastes, and the removal and disposal of these wastes will address this concern.
- Following removal of USTs and their contents, confirmation sampling of soil/fill (including underneath the tank) and groundwater will occur.

Sewer Water Alternative 2 – Removal and Off-Site Disposal

- Transfer of the sewer water and solids from the inactive sewer line into appropriate containers or transport vehicles for off-site treatment and/or disposal.
- The associated sewer line and manhole will be cleaned, and then closed in place by plugging/filling to prevent future buildup of water and solids in the manhole.

Soil Gas Alternative 2 - Institutional Controls, Air Monitoring or Engineering Controls (existing occupied buildings), and Site-Wide Engineering Controls (future buildings)[1]

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- Institutional controls (ICs) will be established in the form of deed notices site-wide to provide notice of certain restrictions upon the use of the property in relation to soil gas.[2] This requirement will be implemented in conjunction with the deed notice requirement for the soil/fill remedy.
- A building-specific assessment of sub-slab soil gas and/or indoor air quality will be required for any of the currently occupied existing buildings on the Site, and for existing buildings that will be occupied in the future, and, if the assessment identifies unacceptable risks/hazards, engineering controls will be implemented to protect the occupants of such existing buildings from unacceptable vapor intrusion risks/hazards~~-~~. The assessment will evaluate vapor intrusion COCs in soil (trichloroethylene [TCE], total xylenes, and naphthalene), and for buildings within 100 feet of a groundwater well with VOCs that exceeded screening levels, additional COCs will be evaluated as part of the assessment (benzene, ethylbenzene, ~~1,3-dichloropropene (total),~~ and vinyl chloride).

Exemption 5, Deliberative, Attorney-Client
[redacted]

Exemption 5, Deliberative
[redacted]

[1] Figure 14 in Appendix I is a schematic drawing that presents the Selected Remedy for Soil Gas. The details will be refined during the remedial design.

[2] Subsequent to issuance of the Proposed Plan, EPA concluded that a classification exception area/well restriction area would not add to the protectiveness of the soil gas remedy and did not include ~~removed~~ this component ~~of~~in the remedy.

- Future new construction will be required to include a vapor barrier or other appropriate means of sealing the ground surface underneath the new building slab or installation of a subsurface depressurization system (SSDS), as determined by EPA.
- In all existing buildings – currently occupied and~~,~~ occupied in the future~~, and new construction~~ – ~~–~~ periodic indoor air monitoring will be required to verify previous assessment results and to confirm that engineering controls continue to protect indoor workers, due to the potential for unacceptable risk from the presence of VOCs in indoor air above EPA vapor intrusion screening levels (VISLs). Air monitoring may also be required in newly constructed buildings. If indoor air monitoring indicates exceedances of EPA VISLs from S~~s~~ite COCs, further evaluation of the data would be needed to determine whether unacceptable risks/hazards exist in which case– property owners or other ~~responsible~~ parties would be required to implement further engineering controls to achieve New Jersey indoor air standards as remediation goals.

[redacted]
Exemption 5, Deliberative, Attorney-Client

Soil/Fill Alternative 4: Institutional Controls, Engineering Controls, Focused Removal with Off-Site Disposal of Lead, and NAPL Removal[3]

- ICs will be established ~~ICs~~ in the form of deed notices site-wide to provide notice that future use of the Site must remain commercial or industrial and identify areas of the Site where contamination exceeds the State of New Jersey residential soil standards.[4] These requirements will be implemented in conjunction with the deed notice requirement for the soil gas remedy.
- Fencing will be required to be maintained and enhanced as appropriate to limit unauthorized access to the Site and use of the Site in a manner inconsistent with the remedy.
- NAPL-impacted soil/fill on Lot 63 will be excavated and disposed of off-site.
- Contaminated soil/fill ~~mateiral~~material~~s~~ will be capped, with a cap that consists of the construction of a barrier over the contaminated areas, to prevent access to and contact with the contaminated media and/or to control its migration.
- A focused excavation and off-site disposal of lead-impacted soil/fill around Building #7 of the Site where high levels of lead were found will be performed.
- The bulkhead will be reinforced or reconstructed, as appropriate, in order to minimize the potential for interaction between the Site and surface water, minimize soil erosion, and prevent off-site transport of soil/fill containing COCs and Contaminants of Potential Ecological Concern (COPECs).

Groundwater Alternative 4 – Institutional Controls, Pump and Treat, and Targeted Periodic In-Situ Remediation[5]

- ICs will be established~~-~~ in the form of Classification Exception Areas (CEAs) and Well Restriction Areas (WRAs) site-wide to provide notice that the groundwater in the area does not meet designated use requirements and to prohibit the installation and use of wells for

[3] Figure 15 in Appendix I is a schematic drawing that presents the Selected Remedy for Soil/Fill. The details will be refined during the remedial design

[4] The Proposed Plan incorrectly referenced the non-residential standards (NRDCSRS). This has been clarified to state that the deed notices will identify areas of the Site where contamination exceeds New Jersey residential soil standards (RDCSRS).

[5] Figure 16 in Appendix I is a schematic drawing that presents the Selected Remedy for Groundwater. The details will be refined during the remedial design.

potable and other uses within the designated area.

- Targeted, periodic in-situ remediation of the groundwater will be conducted. The specific means will be determined during the remedial design with treatability studies to determine the most appropriate treatment approach and reagents. Possible treatments include chemical treatment, biosparging, and air sparging.
- A pump and treat system will be installed to provide hydraulic containment at the river's edge to minimize migration of contaminated groundwater to the river. Extracted groundwater will be collected, treated, and disposed. The number of extraction wells, pumping rate, and individual processes to be utilized for treatment will be determined during the remedial design.
- Groundwater monitoring will be performed to demonstrate that the selected remedy continues to be protective of human health and the environment.

The total estimated cost of the selected remedy is $38,923,100.

DECLARATION OF STATUTORY DETERMINATION

Part 1: Statutory Requirements

The Selected Remedy is protective of human health and the environment, complies with federal and state requirements that are applicable or relevant and appropriate to the remedial action, is cost-effective, and utilizes permanent solutions and alternative treatment (or resource recovery) technologies to the maximum extent practicable.

Part 2: Statutory Preference for Treatment

By utilizing targeted, periodic in-situ treatment to the extent practicable to treat the groundwater contamination in combination with pump and treat to provide hydraulic containment, the Selected Remedy meets the statutory preference for remedies that employ treatment that reduces toxicity, mobility, or volume as a principal element is satisfied. Furthermore, excavation of soil/fill material would reduce the mobility of the lead around Building #7 and NAPL on Lot 63 through removal and appropriate off-site disposal. As required by the disposal facility, the toxicity and volume may be reduced if material is treated to comply with disposal requirements.

Part 3: Five-Year Review Requirements

Because this remedy results in hazardous substances, pollutants, or contaminants remaining on the Site above levels that will allow for unlimited use and unrestricted exposure, a statutory review will be conducted within five years of the initiation of the remedial action to ensure that the remedy is, or will be, protective of human health and the environment, unless determined otherwise at the completion of the remedial action.

ROD DATA CERTIFICATION CHECKLIST

The following information is included in the Decision Summary section of this ROD. Additional information can be found in the administrative record file for this action.

- A discussion of the current nature and extent of contamination is included in the "Summary of Site Characteristics" section.
- The Site COCs and their respective concentrations are presented in the “Summary of Site Characteristics” section.
- A discussion of the potential adverse effects associated with exposure to Site COCs and COPECs are included in the “Summary of Site Risks” section.
- The remediation goals for the Site COCs are presented in the “Remedial Action Objectives” section.
- A discussion of principal threat waste is included in the “Principal Threat Wastes” section.
- A discussion of the current and reasonably anticipated future land and groundwater use assumptions is included in the “Current and Potential Future Land and Resources Uses” section.
- The estimated capital, operation and maintenance, and total present-worth costs are presented in the “Description of Remedial Alternatives” section.
- A discussion of the key factors that led to the selection of the remedy is included in the “Comparative Analysis of Alternatives” and “Statutory Determinations” sections.

AUTHORIZING SIGNATURE

_________________________________ _________________________

Pat Evangelista, Director Date
Superfund and Emergency Management Division
EPA Region 2

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APPENDICES

DECISION SUMMARY

Riverside Industrial Park Superfund Site
Operable Unit One
EPA ID# NJSFN0204232
Newark, Essex County, New Jersey

SITE NAME, LOCATION, AND DESCRIPTION

The Site is currently a 7.6-acre partially active industrial park ~~known as the Riverside Industrial Park~~ located in the North Ward community of Newark, Essex County, New Jersey (Figure 1 of Appendix I). PPG Industries, Inc. (PPG) and its predecessors occupied the Site and conducted paint and varnish manufacturing operations on the Site from approximately 1902 until 1971. After 1971, the Site was subdivided into 15 parcels/lots, and is now identified as the Riverside Industrial Park (Figure 2 of Appendix I).

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Both Riverside Avenue and McCarter Highway border the Site to the west along with a segment of railroad track adjacent to McCarter Highway. Currently, the central and northern portions of the Site contain active industrial/commercial businesses, operating in buildings formerly operated by PPG for paint and varnish manufacturing, while the south side of the Site contains mostly vacant, former PPG buildings. The lots in the northern portion of the Site have Riverside Avenue addresses (Lots 1, 57, 58, 59, 60, 69, and 70), while the lots in the southern portion of the Site have McCarter Highway addresses (Lots 61, 62, 63, 64, 65, 66, 67, and 68). The main entryway is through a vehicle access point on Riverside Avenue; however, pedestrian trespassing occurs regularly through unsecured portions of the Riverside Industrial Park. The majority of the Site (70 percent) is covered with hardened surfaces, such as asphalt (approximately 19 percent), foundation and buildings (approximately 27 percent), and concrete (approximately 24 percent). The remaining portion of the Site is indicated to be pervious (approximately 30 percent). The Passaic River and its tidal mudflat border the Site on the east side. Sections of steel, concrete, and wooden bulkhead provide a retaining wall along most of the Site adjacent to the Passaic River; however, the bulkhead has fallen into disrepair in some locations and several sections of the wooden bulkhead have collapsed. Recent site observations indicate a combined sewer outfall pipe under the area of Lot 63 has collapsed, causing subsidence and a collapse of a section of the bulkhead.

There are 14 buildings at the Site with five of the buildings being vacant (Buildings #6, #7, #12, #15, and #17). At the time of the Remedial Investigation (RI), Buildings #1, #2, #3, #9, #10, #13, #14, and #16 had ongoing business operations along with a small garage building (Building #19) that was used for storage by the occupant of Building #13. The southern portion of the Site is primarily vacant with four of the five unoccupied buildings located there. Former Building #4 was damaged by fire and was demolished in 1982; a sub-grade concrete slab with concrete walls is currently present that was previously used by post-PPG occupants as secondary containment for multiple above-ground storage tanks (ASTs). Debris including several pieces of cars are located near the former Building #4. Former Building #5 was also damaged by fire and demolished in 1982, a vegetated soil/fill mound currently occupies much of the footprint of the building. At the time of the RI, debris/soil mounds were also present within a former AST dike on Lot 68 and on the south side of Building #15 on Lot 58. These soil/fill mounds are of unknown origin. The mound on Lot 68 was removed in 2019.

Smaller structures that are present on the Site include a vacant guard-shack at the entrance to the Site along Riverside Avenue and a small concrete structure of unknown use on the eastern side of Lot 67. Empty ASTs and/or process vessels are present on the exterior of Lots 58, 67, and 69. The empty AST on Lot 58 is a remnant feature from PPG manufacturing practices.

SITE HISTORY AND ENFORCEMENT ACTIVITIES

An 1873 map from Atlas of the City of Newark, as compared to later maps, indicates that most of the Site was reclaimed from the Passaic River with imported fill material. An 1892 Certified Sanborn Map suggests that some filling occurred in the late 1800s; however, the major filling events at the Site occurred from 1892 to 1909 (Figure 3 of Appendix I). The origin of fill material at the Site is unknown. Boating docks shown on the north and central portions of the Site on the 1892 map suggest some placement of fill and reclamation of land from the Passaic River occurred. Most of Lots 57, 61, 62, 63, 64, 66, 67, 68, and 70 were within the footprint of the Passaic River with the Triton Boat Club operating a dock area on the north side of Lot 60. By 1909, most of the lots had been created via filling and land development and were developed with structures used by the Patton Paint Company, a hotel, and the Triton Boat Club. Portions of Lots 57 and 70 remained part of the Passaic River in 1909 but were created by placement of fill material prior to 1931. Lot 67 was completely filled by 1966.

From approximately 1902 to 1971, the Site was used for paint, vanish, linseed oil, and resin manufacturing by the Patton Paint Company and its corporate successors. Patton Paint Company merged into the Paint and Varnish Division of Pittsburgh Plate Glass Company in 1920, which changed its name to PPG Industries, Inc. (PPG) in April 1968. After discontinuing all manufacturing operations, PPG conveyed its interest in the Site in August 1971. Since then, the property has been subdivided into the 15 separate lots that exist today with multiple current and former owners and various industrial-related tenants. Detailed descriptions of the Site's ownership history, operational history, known historical activities, documented releases, and previous site investigations are provided in Sections 1.3 and 1.4 of the Remedial Investigation (RI) Report (2020). Highlights from those descriptions are provided below.

- PPG housed paint and varnish manufacturing operations from approximately 1902 to 1971. PPG's operations involved current Lot 1 and Lots 57 through 70. As stated in the Site Characterization Summary Report (SCSR) (Woodard & Curran, 2015), metal pigments were brought to the Site for the manufacturing of paints, including basic lead carbonate (also known as white lead) and copper oxide.

- Frey Industries, Inc. (Frey) occupied Lots 1, 61, 62, 63, and 64 from 1981 to 2007, when operations ceased. Frey warehoused, packaged, repackaged and distributed client-owned chemicals. As stated in the SCSR, products handled by Frey included polyester resins, flammable liquids, corrosives, and poisons. Jobar operated on a portion of Frey's leased property between 1979 and 1982 before its assets were acquired by Frey in 1983. Hazardous wastes generated during the Jobar and Frey operations were a result of cleaning transfer lines, floor sweepings, and absorbents used for cleanup of spills.

- Baron Blakeslee, Inc. (BBI) was a sub-tenant of Frey in the early 1980s. BBI occupied Lot 61 for product distribution, warehousing a variety of chemical products, and analysis of various chemical blends and waste samples. They also reportedly used Building #7 (Lot 63) as a laboratory, Lot 62 for drum storage, and Lot 68 as a common truck and tanker parking area where a 25-gallon tetrachloroethene spill occurred in 1987. Purex (BBI's parent company) was acquired by Allied Signal. After a series of mergers and acquisitions, BBI became part of Honeywell International, Inc. (Honeywell) in 1999. The City of Newark currently owns Lots 58, 61, 63, 64, and 68.

- Universal International Industries was identified as conducting various manufacturing operations on Lots 1, 63, and 64. No specific information was located regarding its manufacturing activities.

- Samax Enterprises (Samax) occupied Lot 1 from 1999 to 2011 when operations ceased. Samax stored various raw materials on-site and manufactured various chemicals under the brand name Rock Miracle. As stated in the SCSR, other products include deck strippers, deck wash, marine paint removers, restoration cleaners, lead paint removers, masonry cleaners, paint hardeners, and various solvents. An industrial company, 29 Riverside, LLC, currently occupies Lot 1. (The property is currently owned by Hatzlucha on Riverside, LLC.)

- HABA International, Inc. (HABA) occupied Lot 57 from at least 1982 until 1988. Davion Inc. (Davion), successor to HABA, currently operates on Lot 57. (The property is owned by Plagro Realty, Inc.) HABA and Davion manufactured nail polish remover and related products. As stated in the SCSR, products included acetone, ethyl acetate, dyes, fragrances, fatty acids, and lubricating oil. A material identified as HC Blue 2 was released in 1993 as a result of a fire involving nitrated aniline. Acupak, Inc. was a subtenant of HABA on Lot 57 from at least 1987 to 1988 and conducted packaging for HABA.

- Roloc Film Processing (Roloc) occupied Lot 60 from 1985 until 2008 when operations ceased, and manufactured foils utilized for holograms and decoration in plastic, graphic, automobile, and other related industries. As stated in the SCSR, the coatings on the foils were made from solvent-based material, such as butyl acetate, naphtha, ethyl alcohol, methyl isobutyl ketone, and cellosolve acetate.

- Gilbert Tire Corporation has occupied Lot 60 since at least 2015 (following Roloc's occupation) and is the current occupant. (The property is owned by Shefah in Newark, LLC.). There is no manufacturing equipment. Used tires and wheel rims are stored until transferred off property.

- Chemical Compounds, Inc. (CCI) is the listed owner of Celcor Associates, LLC and has occupied Lots 62, 66, and 67 from at least the early 1990s. These companies manufactured hair dyes and other personal hygiene products using the following raw materials: 8-hydroxyquinoline (technical, pure, sulfate, citrate, and benzoate), copper-8-quinolinolate, ammonium adipate/benzoate, diphenylacetonitrile, and 2-nitro-p-phenylene diamine (as stated in the SCSR). Beginning in 2015, Teluca began operating on Lot 62. Teluca packages and distributes hair dyes, hair color, and related ingredients to hair color marketers. The facility includes a laboratory for completing hair dye research, offices, and warehousing.

- Gloss Tex Industries, Inc. (Gloss Tex) occupied Lot 69 from 1979 to at least 1989 when operations ceased. Gloss Tex manufactured bulk nail enamel, lacquer, and related cosmetic products. According to the SCSR, isopropyl alcohol and dibutyl phthalate are stored on-site. Gloss Tex leased the property from Industrial Development Associates/Corporation (IDA), which currently owns Lot 65.

- Ardmore, Inc. has occupied Lots 59 and 69 (following Gloss Tex's occupation) since 1982 and is the current occupant. (The properties are owned by Sharpmore Holdings, Inc. and Albert Sharphouse.) Ardmore, Inc. manufactures soaps and detergents on Lot 59 and stores empty drums on Lot 69. According to the SCSR, a 1-gallon allyl chloride spill occurred in 1987.

- Monaco RR Construction Company stored railroad rails, cross ties, and spikes on Lot 70. Following their operation, Federal Refining Company (Federal) occupied Lot 70 from 1985 to 2007 when operations ceased. Federal was a scrap metal recycler, specializing in recovery of precious metals for arsenic, barium, cadmium, lead, and zinc. According to the SCSR, an unknown quantity of nitrocellulose spilled in 1990. The current tenant is Midwest Construction Company. Material and equipment used by the company are stored and maintained at the property. (The property is owned by the Estate of Carole Graifman.)

Since 1971, at least 11 documented spills and releases have occurred at the Site, and at least seven lots at the Site are subject to New Jersey Industrial Site Recovery Act (ISRA) remediation cases under NJDEP environmental regulations. The ISRA investigations resulted in ICs on these properties with either modified deed notices for engineering controls (such as pavement surface cover) or groundwater CEAs/WRAs to restrict use of contaminated groundwater. RI sampling was conducted site-wide and was not limited by these state ICs. Refer to the RI Report for more details.

In 2009, EPA and NJDEP responded to an oil spill that was discharging from a pipe into the Passaic River called "The Passaic River Mystery Oil Spill" (NJDEP Case #09-10-29-1320-36). The source of the spill was identified at low tide when a pipe discharging the oil was observed. The pipe was sealed, stopping the release. The pipe that discharged into the Passaic River was traced to a catch basin. An oily substance similar to the material observed in the discharge to the river was observed in the catch basin, and a sewer pipe from Building #12 was observed to discharge into the basin. EPA traced the source to two basement tanks in Building #12, a vacant building located on Lot 64 that had recently been connected to the sewer pipe by a hose. Based on its investigation during removal activities, EPA concluded that contents of the two basement tanks had been intentionally discharged into the sewer line and catch basin and released to the river. The sewer line was plugged and the tanks secured by EPA.

Further EPA investigations of Lots 63 and 64 led to the discovery of several 12,000-15,000 gallon USTs adjacent to Building #7, numerous 3,000-10,000 gallon ASTs, an underlain concrete basement/impoundment, a number of 55-gallon drums, and pigment hoppers and other smaller containers in Buildings #7 and #12. Between 2011 and 2014, EPA performed a removal action to address these conditions on Lots 63 and 64. EPA's removal action activities included: removal of the liquids from the basements of Buildings #7 and #12; investigation of the USTs with removal of two of them; investigation and disposal of the ASTs, drums, and smaller containers; and soil, groundwater, and waste sampling. The Site was added to the National Priorities list in May 2013.

In 2014, after the conclusion of the EPA's removal action, PPG signed an Administrative Settlement Agreement and Order on Consent (ASAOC) with EPA to complete the RI and the Feasibility Study (FS) for the Site. The RI was completed in April 2020 and the FS was completed in July 2020. The final RI and FS Reports and other related information in the administrative record file provide the basis for this ROD.

HIGHLIGHTS OF COMMUNITY PARTICIPATION

Throughout the RI/FS process EPA provided progress updates and presented findings to the Passaic River Community Advisory Group (CAG). The CAG consists of stakeholders, who represent a broad range of interests and locales potentially affected by the contamination and cleanup of the Diamond Alkali Co. Superfund Site, including the Lower Passaic River Study Area. Since the Site is adjacent to the Passaic River, the investigation and cleanup of the Site were of interest to the CAG. Presentations given to the CAG were also posted to their website at www.ourpassaic.org.

EPA's preferred remedy and the basis for that preference were identified in a Proposed Plan. On July 22, 2020, EPA released the Proposed Plan for Riverside Industrial Park Superfund Site to the public for comment. Supporting documentation comprising the administrative record was made available to the public at the information repositories maintained at the EPA Region 2 Superfund Records Center, 290 Broadway, 18th Floor, New York, New York, and EPA's website for the Site at www.epa.gov/superfund/riverside-industrial.

EPA published notice of the start of the public comment period and the availability of the above-referenced documents in the Star Ledger on July 22, 2020. The notice was also translated into Spanish and was published in El Diario on July 22, 2020. A news release announcing the Proposed Plan, which included the public meeting date, time, and virtual meeting web link, was issued to various media outlets and posted on EPA's Region 2 website on July 22, 2020. The public comment period initially ran from July 22, 2020 to August 21, 2020 but several extensions were granted, and the public comment period ended on February 19, 2021. Notices of the comment period extensions were published in the Star Ledger and El Diario newspapers and on EPA's website.

A virtual public meeting was held on August 5, 2020, to inform local officials and interested citizens about the Superfund process, to review the preferred alternative as well as other alternatives evaluated in the Proposed Plan, and to respond to any questions from area residents and other attendees. Closed captioning and a Spanish translator were made available for this virtual meeting. During the meeting, public comments were related to details of the proposed remedy, the performance of the work at the Site, and local community health concerns.

Responses to the questions and comments received at the public meeting and in writing during the public comment period can be found in the attached Responsiveness Summary (See Appendix V).

SCOPE AND ROLE OF OPERABLE UNIT OR RESPONSE ACTION

The NCP, at 40 CFR Section 300.5, defines an OU as a discrete action that comprises an incremental step toward comprehensively addressing site problems. A discrete portion of a remedial response eliminates or mitigates a release, threat of a release, or pathway of exposure. The cleanup of a site can be divided into several OUs, depending on the complexity of the problems associated with the site.

For the Riverside Industrial Park Superfund Site, the entire Site is designated as OU1, which is expected to be the only OU for the Site. This ROD describes EPA's selected remedial action for OU1, which addresses contaminated soil, soil gas, sewer water, and groundwater present at the Site. This selected remedial action also addresses various wastes found across the Site. This remedy is expected to be the final action for the Site.

SUMMARY OF SITE CHARACTERISTICS

Hydrogeology

The majority of the Site was reclaimed from the Passaic River through placement of fill material into the river and along the adjacent shore to raise the surface elevation to today's approximate elevation, with most of this work being completed from 1892 to 1909. The fill material ranges in thickness from 6 to 15 feet. The fill material consists predominantly of sands, silts, and gravel, along with man-made materials such as brick, pieces of concrete block, wood, glass, and cinders. The fraction of each material in the fill varies across the Site, however, most of the historic fill material at the Site is characterized as a Loamy Sand or Sand Loam. Based upon historical maps, previous investigations, and data obtained during the RI, fill material is present in surface soil throughout the Site and in subsurface soil where historical filling was conducted to reclaim land from the Passaic River. This material meets the NJDEP definition of "historic fill" and, consistent with that definition, has been shown by RI data to be impacted by chemicals and metals. The sources of fill material are unknown. As fill placement occurred over a more than 30-year period, the sources, and thus the physical and chemical properties, of the fill could have differed over time. The historic fill material at the Site was also likely to have been impacted by historical and/or recent operations and recent and illegal disposal. Lower portions of the fill are saturated, as evidenced by groundwater depths that are typically less than 6 feet below grade. A silt loam underlies the fill unit over the majority of the Site except in areas to the northwest.

In order to understand the movement of groundwater at the Site, groundwater gauging was conducted at Site wells during three groundwater sampling events, slug testing was performed, and tidal influence studies were completed in a number of wells at the Site. The wells installed as part of the RI and existing wells on Site evaluated the shallow fill unit (wells named with the 100-series wells) and the alluvial deposits (wells names with the 200-series wells), which are referred to as the deep unit wells. Wells monitoring the shallow unit were generally screened from 2 to 12 feet below ground surface (bgs) with recharge attributed primarily to precipitation and higher surface elevation areas to the west as well as recharge from the Passaic River during high tide. The deeper groundwater unit is composed of quaternary alluvium (a geological unit known as Qal) and glacial lake deposits (a geological unit known as Qbn), which are hydraulically connected. Wells monitoring the deep unit were screened from 20 to 26 feet bgs with recharge attributed primarily to higher surface elevation areas to the west as well as some leakage from the overlying shallow fill unit. Groundwater movement within the shallow fill unit would be expected to have a limited vertical component of flow due to the observed permeability/grain-size differences between the fill material and underlying fine-grained unit (silt loam), although the silt loam layer is thin and contains a sand fraction. Monitored groundwater elevations also suggest these deep wells are under tidal influence, which suggests some recharge from the Passaic River. The lacustrine lake bottom sediments (a geological unit known as Qbnl) underlying the deltaic deposits is believed to represent a semi-confining unit to vertical groundwater flow.

The primary groundwater flow direction in both the shallow and deep units is east toward the Passaic River, and both the shallow and deep groundwater units are considered to discharge to the Passaic River. Hydraulic conductivity in the wells tested at the Site varied between 4 and 264 feet per day (ft/day). While the data indicate a range of approximately two orders of magnitude for hydraulic conductivity, the fact that many of the wells are constructed in fill materials suggests this range is reasonable given the heterogeneity of fill. The fill material can reasonably be expected to vary between silty sand to low fines content sand and gravel mixes. Generally, the hydraulic conductivity appears to be higher in fill materials on the southern portion of the Site based on the slug-test results in MW-109 and MW-123 with a hydraulic conductivity in fill in the southern half of the Site ranging from approximately 30 to 260 ft/day (see Figure 5 for location of monitoring wells). In the fill in the northern half of the Site, the hydraulic conductivity ranges from 10 to 64 ft/day. In the deeper unit, the soil types vary between silty sands and sand and gravel both related to Qal and Qbn deposits. The wells in the deeper unit are screened in the Qal deposits, with the exception of MW-205 which is screened in the Qbn deposits. The hydraulic conductivity in the Qal appears to vary between approximately 4 and 264 ft/day. The lowest conductivities (4 – 12 ft/day) in the Qal were interpreted from MW-201. The conductivities for MW-202 through MW-204 range from 24 to 264 ft/day. This range likely reflects the heterogeneity expected in the alluvium left behind by the Passaic River. The interpreted conductivity from slug tests in MW-205 in the Qbn deposits varied between 181 and 230 ft/day and is generally reasonable given the description of this unit as deltaic sands and gravels.

Field-specific conductivity readings collected during groundwater sampling events indicate 25 of the 36 wells on the Site had conductivity readings above 1 millisiemens per centimeter (mS/cm), indicating brackish water. Groundwater samples from four of the five deep wells had conductivity readings that slightly exceeded 1 mS/cm. Higher specific conductivity readings in the range of possible brackish conditions were generally associated with wells in the northern portion of the Site closer to the river (MW-116, MW-118, MW-119, and MW-121).

The largest changes in groundwater elevations due to tidal changes are in the wells immediately adjacent to the shoreline. Tidal fluctuations in the deep unit indicate that deep wells on the north end of the Site also appear to exhibit more tidal influence suggesting that the materials on the more northern and inland portions (near MW-205) are more conductive or better connected to the river at depth or both.

Remedial Investigation

The RI was conducted in two phases of work from 2017 through 2019. Soil/fill material, shallow and deep groundwater, indoor air, water and deposited solids in sewer lines, water from sump pumps, discharge water from bulkhead pipes, and miscellaneous wastes were all sampled to define the nature and extent of contamination at the Site. Based on the results of the RI, EPA identified several concerns and organized them into the five categories of media below:

- Wastes. This medium includes LNAPL in the basement of Building #15A, USTs containing LNAPL and/or an aqueous solution on Lot 64, the NAPL-impacted soil/fill material surrounding the USTs, and several wastes in abandoned buildings.
- Sewer Water. This medium includes water and settled solids with elevated VOC concentrations in an inactive manhole.
- Soil Gas. The concentrations of VOCs in the soil/fill material and groundwater may impact the quality of indoor air due to vapor intrusion.
- Soil/Fill. This medium was found to be impacted by several contaminants, which generally included metals (lead, arsenic, and copper), PCBs, VOCs, and SVOCs.
- Groundwater. This medium was found to be impacted by several contaminants, which generally include metals (lead), VOCs, and SVOCs in the shallow groundwater unit and VOCs and SVOCs in the deep groundwater unit.

EPA is also working in conjunction with NJDEP to address unregulated discharges to the Passaic River from a pipe along the bulkhead on Lot 57. See discussion on Lot 57 below for more information.

Each of the media mentioned above are discussed in more detail in the following sections of this ROD. The following discussion focuses only on the media/contaminants for which EPA has determined that an action is needed. Additional information can be found in the RI Report.

Waste

This medium includes LNAPL in Building #15A, the USTs containing LNAPL and/or an aqueous solution on Lot 64, the NAPL-impacted soil/fill material surrounding the USTs, and several wastes in abandoned buildings. There are small volumes of contained waste found in Buildings #7, #12, and #17. These wastes are not associated with current operations, and the contents are not characterized as hazardous wastes for disposal purposes under the Resource Conservation and Recovery Act (RCRA). However, based on RI sampling, there are some constituents within the wastes that are hazardous, such as chromium or lead, and there is the potential for contaminants to be released into the environment.

Within Building #7, a white chalky talc-looking substance remains in an approximately 5-foot diameter hopper. The top of the hopper is accessible from the second floor, and the chalky contents are visible approximately 5 feet below the top. The estimated volume of solid waste in the hopper is approximately 11 cubic yards (CY). In Building #12, a plastic 55-gallon drum contains approximately 50 gallons of liquid waste. In Building #17, a five-gallon bucket labeled as a filler contains a solid waste.

Six USTs were identified in a tank field north of Building #12 on Lot 64. One UST was found to contain 1,600 gallons of LNAPL, which was characterized as diesel/heating oil approximately 0.9-foot thick. Approximately 3,500 CY of NAPL-impacted soil/fill material is surrounding the USTs. All six USTs contained liquid that was sampled, and the results found that none of the UST liquid was classified as a hazardous waste for disposal purposes under RCRA. Each tank measured approximately 30 feet (ft) long by 8 ft in diameter, and they contained a combined volume of approximately 32,600 gallons of liquid and 2,600 gallons of settled solids in the USTs (total amount). While the liquid is considered non-hazardous for waste disposal, the liquid contains primarily VOCs and chlorinated VOCs. The same VOCs found in the USTs were also reported in nearby groundwater wells. The tank contents are a potential source of soil/fill and groundwater contamination.

A portion of Building #15A also contains LNAPL in pooled water under a steel-grated floor. The LNAPL is approximately 0.5-foot to 0.65-foot thick and very viscous. Assuming that the grate and liquid underlies the entire floor area (approximately 650 square ft), and assuming an average thickness of 0.6-ft, the volume of LNAPL in Building #15A is estimated at 2,900 gallons. Based on RI laboratory results, the LNAPL is characterized as diesel fuel/heating oil.

Figure 4 in Appendix I identifies the areas of concern discussed above.

Sewer Water

The RI included an investigation of the sewer system at the Site. Sampling results for water collected from an inactive manhole on Lot 1 (identified in the RI as Manhole #8) found methylene chloride and trichloroethylene (TCE) at levels that exceeded the federal Maximum Contaminant Level (MCL). A solid sample collected from Manhole #8 also contained elevated levels of methylene chloride and toluene. The VOC concentrations in the water and solid samples in Manhole #8 were higher than nearby groundwater concentrations. Although there is currently no flow within this inactive sewer line on the Site, there is potential for contaminants within this line to be released into the environment. Other portions of the sewer system on the Site were not identified as potential sources of contamination to groundwater or soil/fill (see Figure 4 in Appendix I for location of the inactive sewer and manhole).

Soil Gas

Following the initial two rounds of groundwater sampling, the shallow groundwater results were screened against NJDEP VISLs (see Figure 5 in Appendix I for sampling locations). This comparison suggested that vapor intrusion may be a potential exposure risk/hazard.[6] Since a potential risk was found, indoor air sampling was conducted in 2019 within occupied buildings of the Site (Buildings #1, #2, #3, #9, #10, #14, and #16). Additionally, three exterior ambient air samples were collected to determine potential background concentrations near the occupied

[6] This comparison was conducted during the RI/FS for this Site. In May 2021, after the release of the Proposed Plan, NJDEP ~~finalized amendments to its remediation standards, including by~~ promulgated~~ing~~ indoor air remediation standards for a number of VOCs, replacing the previous screening levels for those VOCs. NJDEP updated its Vapor Intrusion Technical (VIT) guidance shortly thereafter.

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buildings. The samples were analyzed for benzene, ethylbenzene, xylenes, 1,1,2-trichloroethane (TCA), carbon tetrachloride, chloroform, isopropylbenzene, naphthalene, TCE, and vinyl chloride.

The Baseline Human Health Risk Assessment (BHHRA) vapor intrusion modeling indicated that there were no unacceptable health risks/hazards associated with exposure to indoor air from soil gas (modelled from shallow groundwater concentrations). A comparison of the shallow fill unit data to NJDEP's VISLs~~7~~ identified benzene, ethylbenzene, total xylenes, 1,3-dichloropropene (total), TCE, and vinyl chloride at concentrations above NJDEP VISLs (refer to Table 3-1 in FS Report). ~~While~~ Under NJDEP's VIT guidance, ~~VISLs are a to-be-considered (TBC),~~ these ~~an~~ exceedances ~~would~~ trigger the need to perform an investigation for an occupied building within 100-feet of the monitoring well. The BHHRA also identified that soil/fill concentrations of naphthalene, TCE, and xylenes could present unacceptable risks/hazards to future indoor workers from potential soil gas intrusion (modelled from soil/fill concentrations) on three lots (Lots 58, 62, and 68), should these currently vacant areas be subject to improvement via construction of new buildings or occupation of existing vacant buildings (see Figures 6A, 6B, and 6C in Appendix I and Table 1 in Appendix II).

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Soil/Fill

An extensive sampling regime was conducted to analyze the nature and extent of contamination in soil/fill material. Over 100 soil borings and a total of 210 soil samples were collected across the Site (see Figure 5 of Appendix I for sampling locations and Table 2 of Appendix II for a summary of soil/fill samples with detected contaminant concentrations that exceeded the RGs).

The majority of the Site (except the northwest section) was reclaimed from the Passaic River with imported fill. Fill material is documented at the surface throughout the Site with greater fill thicknesses associated with areas reclaimed from the Passaic River (up to 15 feet thick) and is generally described as a Loamy Sand or Sand Loam in most areas. Permeability testing conducted on two soil samples collected beneath the fill unit representative of the former riverbed indicated permeabilities of 1.1×10^{-5} to 3.3×10^{-7} centimeters per second (cm/s). EPA geotechnical data indicate that this former riverbed material beneath the fill is more appropriately described as a silt loam. The silt loam layer grades into a fine to coarse-grained sand and gravel with depth, which includes the following geological units known as Qal and Qbn followed by Qbnl, identified as glacial lake bottom deposits.

The RI identified a NAPL-impacted soil/fill material in several soil borings (Borings B-34, B-35, and B-90) east and south of the USTs on Lot 64. Isolated areas of NAPL-impacted soil/fill material were also observed in the soil/fill material during the drilling of a monitoring well (MW-201) on Lot 63. However, samples collected from monitoring wells in the vicinity of the USTs did not have a measurable thickness of LNAPL in the groundwater except for one temporary well-point installed at B-34. The sources of the NAPL-impacted soil/fill material on Lots 63 and 64 are likely releases from the USTs or illegal dumping. Samples collected from monitoring wells and temporary wells did have elevated benzene, toluene, ethyl benzene, and xylenes (BTEX) concentrations, which are potentially indicative of petroleum impacts to groundwater.

The RI identified lead as one of the primary contaminants of concern across the Site. A significant amount of lead contamination was found in soil/fill material on Lots 63 and 64 around Building #7. Elevated lead (at concentrations that exceeded the NJDEP Non-Residential Direct Contact Soil Remediation Standard (NRDCSRS) of 800 mg/kg) was also found on Lots 1, 57, 58, 61, 65, 67, 68, 69, and 70. Arsenic and copper were also metals identified as a concern in the RI, and they were found to be primarily co-located with lead in soil/fill material on Lot 63 (see Figures 7A, 7B, and 7C in Appendix I).

The VOCs identified at the Site include benzene, naphthalene, vinyl chloride, TCE and total xylenes. The highest chlorinated VOC soil sampling results were from Lot 68, where a chlorinated solvent release is known to have occurred, and on Lot 64, adjacent to the USTs. ~~-~~During the RI, ~~B~~benzene, naphthalene, and vinyl chloride concentrations exceeded NJDEP NRDCSRS on Lots 62, 64, and 68. ~~In May 2021, after the release of the Proposed Plan in July 2020, NJDEP finalized amendments to its remediation standards and, as a result, naphthalene and vinyl chloride no longer exceed the NRDCSRS.~~ Note that naphthalene may be reported as a VOC or SVOC (see Figures 8A, 8B, and 8C in Appendix I). In May 2021, after the release of the Proposed Plan in July 2020, NJDEP finalized amendments to its remediation standards and, as a result, naphthalene and vinyl chloride no longer exceed the NRDCSRS.

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SVOCs of concern at the Site are a group of chemicals known as polycyclic aromatic hydrocarbons (PAHs). Benzo(a)pyrene was the most prevalent PAH across the Site, with concentrations exceeding the NJDEP NRDCSRS of 2 mg/kg on Lots 1, 57, 60, 61, 62, 63, 64, 66, 67, and 69. The other three PAH compounds of concern (benzo(a)anthracene, benzo(b)fluoranthene, and dibenzo(a,h)anthracene) had elevated concentrations that exceeded the NJDEP NRDCSRS on Lot 63 adjacent to known NAPL-impacted soil/fill material and on Lot 67. PCB concentrations exceeded the NJDEP NRDCSRS of 1 mg/kg on Lots 57, 64, 65, 67, and 70 (see Figures 9A through 9E in Appendix I).

Groundwater

The RI characterized the nature and extent of groundwater contamination beneath the Site. To conduct this characterization, 28 monitoring wells were installed (in addition to the 8 existing wells) to sample the shallow groundwater unit (also referred to as the shallow fill unit) and five monitoring wells were installed to sample the deep groundwater unit (see Figure 5 of Appendix I and Table 3 of Appendix II). Note that groundwater characterization was done site-wide and not by lot as was done with the soil/fill characterization, but lot numbers or building numbers were used to help identify the location of the contamination and the sources.

At the Site, groundwater is designated by NJDEP as a Class IIA aquifer, which means that this groundwater may be a source of potable water (e.g., drinking water). However, the groundwater is not currently used for potable water and is not reasonably expected to be used as a potable source in the future because the Site and surrounding area are served by the City of Newark's drinking water system, and the site-specific conductivity readings of the groundwater indicate possible brackish conditions.

Shallow Groundwater Unit

Several VOCs were detected throughout the shallow groundwater unit (also known as the shallow fill unit) at levels that exceeded the NJDEP Class IIA standards. Benzene, toluene, ethylbenzene, and total xylenes (also known as BTEX) were the most common VOCs detected in the shallow groundwater unit and are indicative of petroleum impacts. BTEX was primarily found in the UST area on Lot 64, extending east/southeast onto Lot 63 downgradient of the UST area. It was also found in a well adjacent to Building #15 on Lot 58. Chlorinated VOCs (including methylene chloride, tetrachloroethylene (PCE), TCE, and vinyl chloride) were primarily detected in monitoring wells on Lots 63 and 64 surrounding the USTs. The source of these chlorinated VOCs is likely the UST, which also contain elevated levels of chlorinated VOCs (see Figures 10A through 10I in Appendix I).[8]

SVOCs (including 1,4-dioxane and p-cresol) and PAH compounds (including 2-methylnaphthalene, benzo(a)anthracene, benzo(b)fluoranthene, indeno(1,2,3-cd)pyrene, and bis(2-ethylhexyl)phthalate) were also present in the shallow groundwater unit at concentrations that exceed the NJDEP Class IIA standards. The PAH compounds were primarily detected in groundwater monitoring wells located within the vicinity of NAPL-impacted soils and where BTEX was also detected. 1,4-Dioxane exceedances were wide-spread across the Site, primarily focused on the eastern side of the Site (see Figures 11A through 11G in Appendix I).

Lead in groundwater was generally located in two areas: one area is on Lots 63 and 64, and the second area is north of Building #1 along the eastern and northern property boundaries. Lead concentrations in the shallow groundwater unit exceeded NJDEP Class IIA standards in wells located on Lots 57, 60, 61, 63, 64, 66, and 67~~.~~ (see Figure 12 in Appendix I.).

As previously mentioned, while NAPL-impacted soil/fill material was observed in the UST area of Lot 64, measurable LNAPL was not observed in a nearby shallow monitoring well. No dense non-aqueous phase liquid (DNAPL) was observed in the RI monitoring wells.

Deep Groundwater Unit

Five monitoring wells were installed in the deep groundwater unit, with two wells in the northern portion of the Site and three in the southern portion.

Fewer VOCs were detected in the deep groundwater relative to the shallow groundwater unit. Benzene, PCE, 1,1,2,2-tetrachloroethane, and 1,1,2-TCA were the most common VOCs detected in the deep groundwater unit however, only Benzene and PCE exceeded NJDEP Class IIA standards in wells on Lot 63 and on Lot 58 near Building #15.

For SVOCs, benzo(a)anthracene and 1,4-dioxane concentrations in the deep groundwater exceeded NJDEP groundwater standards in wells on Lot 63 and Lot 64, and on Lot 57 near Building #10.

[8] Acetone was also identified as a concern on Lot 57. EPA is working in conjunction with NJDEP to address unregulated discharges to the Passaic River from a pipe along the bulkhead on Lot 57. See discussion on Lot 57 below for more information.

Lead was not detected above NJDEP groundwater standards in the deep unit. Metals exceeding NJDEP Class IIA standards in the deep groundwater monitoring wells included iron, arsenic, manganese, and sodium.

See Figures 13A through 13D in Appendix I for groundwater exceedances of the deep unit.

Lot 57: Discharge to the River

The RI identified two issues on Lot 57: 1) a river wall sewer pipe coming out of the bulkhead was found to be discharging elevated toluene and acetone concentrations to the river (the acetone concentration was 83,000 micrograms per liter (µg/L), which is above the NJDEP Class IIA standard of 6,000 µg/L); and 2) elevated concentrations of acetone were found in the groundwater adjacent to the building. The nearest shallow fill well (MW-118) to the wall sewer sample had acetone concentrations from 51,000 to 71,000 µg/L.

EPA determined that both issues are associated with ongoing operations at Lot 57 and is coordinating with NJDEP to resolve these issues. The Lot 57 sewer pipe, and the releases to the river from this waste line, are not being addressed as part of this remedy because there is no known impact on the Site from the sewer line. Further, it is EPA's current understanding that the cleanup of acetone in groundwater at Lot 57 was conducted under NJDEP cleanup authorities, with work overseen by a New Jersey Licensed Site Remediation Professional (LSRP). Groundwater sampling conducted during the pre-design investigation will confirm these conclusions. The NJDEP assigned case number for this remediation is 20-04-09-0923-04.

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CURRENT AND POTENTIAL FUTURE LAND AND RESOURCE USES

Land Use

The Site is zoned for industrial use[9] and is sub-divided into 15 lots, seven of which are occupied and the other eight of which are unoccupied. The occupied lots are currently used for industrial purposes. The five lots owned by the City of Newark, Lots 58, 61, 63, 64, and 68, as well as Lots 57 and 70, are expected to be used in the future for industrial purposes. The property owners of the remaining eight lots have indicated their intentions to continue current commercial/industrial uses. Portions of several lots within the Site are subject to NJDEP Deed Notice/Declarations of Environmental Restriction, which are ICs that provide notice of limitations on use of the properties to non-residential uses.

The Site is ~~part of~~located in the North Ward in the City of Newark and a sub-district of the Passaic riverfront, which is located between Delavan Avenue and Fourth Avenue, and is a "dedicated industrial zone" for industrial and commercial uses. Surrounding properties include bulk storage tanks to the north, an auto body shop to the northwest across Riverside Avenue, and a construction contracting business to the south. There are medium density residential units west of McCarter

Commented [SM24]: Would it be more accurate to say that the Site is located in the North Ward? I don't really know, but "part of the North Ward" sounds awkward to me.

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[9] City of Newark. 2013. Public Access & Redevelopment Plan. Newark's River. Final Plan Approved August 7, 2013 by the Newark Municipal Council. April.

Highway. New industrial development and increased future use of marine transportation is anticipated for the North Ward. The City of Newark's 2013 redevelopment plan states that:

> *The zoning of the area east of McCarter Highway will continue to support and attract manufacturing businesses that provide jobs and make use of constrained riverfront sites. Environmental contamination, like that recently identified by the Environmental Protection Agency at Riverside Industrial Park, will need to be addressed for this redevelopment strategy (or any other) to succeed.*

Considering the previously mentioned factors, EPA determined that the reasonably anticipated future land use at the Site is expected to remain industrial. EPA acknowledges that, in the State of New Jersey, especially in urban areas along waterways, former industrially zoned areas are being re-zoned and re-developed for future recreation and residential use. However, there is no information that suggests that this Site would be re-zoned for future recreation and residential use at this time.

Groundwater Use

Groundwater underlying the Site is considered by the State of New Jersey to be Class IIA aquifer, a source of potable water. However, residential and non-residential users in the area of the Site are currently using publicly supplied potable water, which is treated to assure all drinking water standards are met. Furthermore, specific conductivity readings of the shallow groundwater indicate possible brackish conditions due to tidal influence of the adjacent Passaic River. There are no current uses of groundwater resources at the Site and none are reasonably anticipated in the future based on the City of Newark's Master Plan for the North Ward.

SUMMARY OF SITE RISKS

Baseline human health and ecological risk assessments (BHHRA and SLERA) were conducted to evaluate the current and future impacts of site-related contaminants at the Site including receptors on the various lots under current and future exposure assumptions (e.g., indoor workers, outdoor workers, trespassers, and construction workers) and other receptors such as visitors to the lots. The final BHHRA Report, dated April 20, 2020, evaluated cancer risks and noncancer Hazard Quotients (HQs) for individual chemicals and Hazard Indices (HIs) for all chemicals with noncancer HQs that were summed based on the individual receptor exposures on the lots and exposures to site-wide groundwater under the assumption that shallow and deep groundwater would be used as a drinking water source in the future. The BHHRA also evaluated hypothetical future residential use of the Site to determine the need for ICs restricting future development on the Site.

A separate analysis was conducted to evaluate exposures to lead by receptors under current and future land use. The lead evaluation included comparing the Exposure Point Concentrations (EPCs) (i.e., for lead, the arithmetic mean concentrations) against the screening levels of 200 mg/kg (milligram/kilogram) for hypothetical future residents and 800 mg/kg for nonresidential receptors (e.g., industrial workers). In addition, EPA's Integrated Exposure Uptake Biokinetic (IEUBK) Model for Lead in Children and Adult Lead Methodology (ALM) are used to estimate the concentration of lead in the blood of children and adults, respectively, who might be exposed to lead-contaminated soils. The estimated blood lead concentrations are used to evaluate the potential need for remedial action.

The SLERA, dated April 20, 2020, provides ecological risks for the individual lots and a side-wide assessment.

Baseline Human Health Risk Assessment

Summary of the Human Health Risk Assessment Process

A four-step process is utilized for assessing site-related human health risks for reasonable maximum exposure (RME) scenarios, and the results are summarized below.

- *Hazard Identification* – uses the analytical data collected to identify the contaminants of potential concern (COPCs) at the site for each medium, with consideration of a number of factors explained below.
- *Exposure Assessment* – estimates the magnitude of actual and/or potential human exposures, the frequency and duration of these exposures, and the pathways (*e.g.*, ingesting contaminated soil) by which humans are potentially exposed.
- *Toxicity Assessment* – determines the types of adverse health effects associated with chemical exposures, and the relationship between magnitude of exposure (dose) and severity of effect (response).
- *Risk Characterization* – summarizes and combines outputs of the exposure and toxicity assessments to provide a quantitative assessment of site-related risks. The risk characterization also identifies contamination with concentrations that exceed acceptable levels, defined by the NCP as an excess lifetime cancer risk greater than 1×10^{-6} to 1×10^{-4} (risk of one in a million to one in ten thousand) or a HQ/HI for noncancer health effects greater than 1; contaminants at these concentrations are considered COCs and are typically those that will require remediation at the site. Also included in this section is a discussion of the uncertainties associated with these risks and HQ/HI.

The BHHRA evaluated both cancer risks and noncancer HQ/HIs from exposure to COPCs on each of the 15 individual properties (lots) that comprise the Site, as documented in the BHHRA (April 2020). Currently, seven properties are occupied and eight properties are vacant. The BHHRA evaluates exposure under current industrial land use, future industrial/commercial land use and future residential land use for the following receptors: young child (6 years and younger), adolescent (10 to 18 years), and adult (18 years and older) under these land uses assuming baseline conditions – *i.e*., no remedial actions or ICs to prevent or control potential exposures. The BHHRA is based on current EPA risk assessment policy, guidance, and guidelines. The cancer risk and noncancer hazards on the individual lots are above EPA's levels of concern for various receptors who may be exposed to soils, groundwater and vapors in indoor air.

Cancer risks and noncancer hazards were calculated based on an estimate of the RME expected to occur under current and future conditions. The RME is defined as the highest exposure that is reasonably expected to occur at a site (EPA, 1989).

An assessment of lead exposure was also conducted. The assessment of lead is conducted based on blood lead concentrations (PbBs) that correlate exposure and adverse health effects. To predict blood lead concentration and the probability of a child's blood lead concentration exceeding 5 micrograms/deciliter (µg/dL) based on a given multimedia exposure scenario, a model which considers lead exposure and toxicokinetics in a receptor – i.e., a child (using the IEUBK model or fetus (using the ALM) to derive an exposure level that satisfies the risk reduction goal i.e., there should be no more than 5% of the exposed individuals with PbBs greater than 5 ug/dL.

The following sections summarize the basic steps of the Superfund BHHRA process.

Hazard Identification

In this step, COPCs in each medium are identified based on such factors as toxicity, frequency of detection~~occurrence~~, fate and transport of the contaminants in the environment, concentrations, and mobility. The BHHRA began with selecting COPCs in soil, groundwater, and vapors that could potentially cause adverse health effects in exposed populations. COPCs are selected by comparing the maximum sample detected concentrations of each chemical with appropriate risk-based screening levels. COPCs were further evaluated in the BHHRA for the individual receptors and exposure pathways.

With the exception of lead, a summary of the exposure point concentrations (EPCs) for the COPCs, or those chemicals requiring a response, can be found in Appendix II, Table 4a. For lead, the arithmetic mean concentration of all samples collected from the appropriate soil interval or the mean of maximum concentration from groundwater was~~ere~~ used as the EPC for each chemical, and these values can be found in Tables 4b – 4d. A comprehensive list of EPCs for all COPCs can be found in Appendix C (Table 3 series) of the BHHRA.

Exposure Assessment

Exposure assessment estimates the type and magnitude, frequency, and duration of a human receptor's exposures to COPCs in the environment. The exposure assessment evaluates exposure pathways by which individuals are or can be exposed to the COPCs in different media (e.g., soil, groundwater, and indoor air from vapors). Consistent with Superfund policy and guidance, the BHHRA assumes no remediation or ICs to mitigate or remove hazardous substance releases. Cancer risks and noncancer HIs were calculated based on an estimate of the RME (defined above) expected to occur under current and future conditions at the Site.

The BHHRA evaluated potential cancer risks and noncancer hazards (HQ/HI) under current and potential future land uses. Factors relating to the exposure assessment include, but are not limited to, the concentrations that RME individuals are or can be exposed to and the potential frequency and duration of exposure. The three main elements of exposure assessment are the characterization of exposure setting, the identification of potential exposures (i.e., conceptual site model) and the quantification of exposure.

Land Use. Based on the current and future Site land use, the occupied lots are: Lots 1, 57, 59, 60, 62, 69, and 70; and the vacant lots are: Lots 58, 61, 63, 64, 65, 66, 67, and 68.

Conceptual Site Model. Table 5 summarizes current exposures at occupied lots, current exposures at unoccupied lots, and receptors for future exposures at all lots. The exposure pathways are discussed in the BHHRA Section 4.1 to Section 4.4.

Soil. The BHHRA evaluated samples collected from the surface soil (0 to 2 ft); subsurface soil (0 to 4 ft); and all soils (0 to 13 ft) that could potentially cause adverse health effects in exposed individuals. Under future conditions, the assessment considered subsurface soil being moved to the surface during future site redevelopment.

Groundwater. Site groundwater is classified as Class IIA by the State of New Jersey. The classification assumes all water may potentially be used as a drinking supply unless restrictions are enforced by the NJDEP. The assessment assumes consumption of groundwater based on sampling data collected from the shallow and deep aquifers.

Vapor Intrusion. Mathematical modeling was used to predict reasonable maximum indoor air concentrations due to vapor intrusion (from vapors in soil [all depths] and shallow and deep groundwater) in undeveloped portions of the properties. For the lots with currently occupied buildings, groundwater results from 2018 were used to inform indoor air sampling in these on-site buildings to assess the potential for vapor intrusion. Indoor air samples were collected from the seven occupied buildings (i.e., Buildings #1, 2, 3, 9, 10, 14, and 16) in January and February 2019. Three ambient air samples were also collected near these buildings to assess potential background sources of VOCs. These air samples were analyzed for select VOCs that were present in shallow groundwater above EPA vapor intrusion screening levels (benzene; 1,1,2-trichloroethane; carbon tetrachloride; TCE; chloroform; vinyl chloride; naphthalene; ethylbenzene; xylenes; and isopropyl benzene (cumene)).

The quantification of exposure includes three elements: the calculation of the EPCs (e.g., units of mg/kg in soil), the calculation of intakes represented in units of milligrams/kilogram-day (mg/kg-day), and measured or modeled air concentrations.. The potential exposure pathways under current and anticipated future land use at and around the 15 lots that comprise the Site are summarized in the ROD Tables 1.1 to 1.3 for current, future and hypothetical future exposures, respectively.

The BHHRA evaluated potential risks to RME individuals associated with both current and potential future land uses. Below is a list of current and future receptors including areas where they may be exposed.

Potential Current and Future Exposures and Receptors.

- **Outdoor worker (adult)**: incidental ingestion, dermal contact, and inhalation of airborne soil particulates, and inhalation exposure of volatile COPCs released from surface (0 to 2 ft) and subsurface soils (0 to 4 ft) under current and future land use.
- **Indoor worker (adult)**: inhalation of volatile COPCs in subsurface soil (i.e., 0 ft. bgs to approximately 13 ft. bgs) and shallow groundwater due to vapor intrusion, and incidental

ingestion and dermal contact with outdoor surface soil that has been incorporated into indoor dust.

- **Utility worker (adult)**: incidental ingestion, dermal contact, and inhalation of soil or groundwater vapors and airborne soil particulates from depths of up to 0 to 13 ft bgs.
- **Construction worker (adult):** incidental ingestion, dermal contact, and inhalation of soil from depths of 0 to 2 ft. bgs or groundwater vapors from depths of 0 to 13 ft bgs) and airborne soil particulates from surface soils.
- **Trespasser (adolescent/adult)**: incidental ingestion, dermal contact, and inhalation of airborne soil particulates, and inhalation exposure to volatile COPCs from surface (0 to 2 ft bgs) and subsurface soils (0 to 4 ft bgs) is also possible.
- **Visitor (child/adult)**: incidental ingestion, dermal contact, and inhalation of airborne soil particulates (0 to 2 ft bgs), and inhalation exposure to volatile COPCs from surface and subsurface soil (0 to 4 ft. bgs) and shallow groundwater is also possible while outdoors.
- **Off-site worker (adult)**: off-site worker exposures were evaluated using outdoor worker exposures. No site-related contamination (soil or groundwater) is known to extend off-site.
- **Off-site resident (child/adult)**: off-site residential exposures were evaluated using on-site future residential exposures. No site-related contamination (soil or groundwater) is known to extend off-site.

Hypothetical Future.

- **Hypothetical future resident (child/adult)**: exposure assumes medium-density residential units and hypothetical future potable use scenarios for shallow and deep groundwater. Exposure to volatile COPCs in shallow groundwater via vapor intrusion was also assessed.

A summary of all the exposure pathways considered in the BHHRA, and the basis for inclusion in the BHHRA, can be found in Table 5. Typically, exposures are evaluated using a statistical estimate of the EPC, which is usually an upper bound estimate of the average concentration for each contaminant, but in some cases, where adequate data are not available to calculate an EPC, the maximum detected concentration is used. The EPCs for the various media are provided in Tables 4a – 41d.

Toxicity Assessment

In this step, the types of adverse health effects associated with contaminant exposures and the relationship between magnitude of exposure and severity of adverse health effects are determined.

Potential health effects are contaminant-specific and may include the risk of developing cancer over a lifetime or other noncancer health effects, such as changes in the normal functions of organs within the body (e.g., changes in the effectiveness of the immune system). Some contaminants are capable of causing both cancer and noncancer health effects.

Under current EPA guidelines, the likelihood of cancer risks and noncancer hazards due to exposure to site chemicals are considered separately. Consistent with current EPA policy, it is assumed that the toxic effects of the site-related chemicals would be additive. Thus, cancer risks and noncancer hazards associated with exposures to individual COPCs were summed to indicate the potential risks and hazards associated with mixtures of potential carcinogens and noncarcinogens, respectively. For those chemicals with total hazards greater than the goal of protection of an HI = 1, a further assessment of the Target Organ Specific Hazard Index (TOSHI) was developed and evaluated for exceedance of a HQ for the individual toxic endpoint equal or greater than 1.

Toxicity data for the human health risk assessment were selected consistent with EPA's Toxicity Hierarchy (EPA 2003). This information for the COCs is presented in Table 6 (noncancer toxicity data summary) and Table 7 (cancer toxicity data summary). Additional toxicity information for all COPCs is presented in Chapter 5 of the BHHRA.

Lead. Potential exposures to lead in soil are evaluated separately from the assessment for other COPCs because EPA evaluates the significance of lead exposures using the PbB~~d lead~~ level as an index of exposure, rather than in terms of cancer risk or noncancer hazards. Because there are no published quantitative toxicity values for lead it is not possible to evaluate risks and hazards from lead exposure using the same methodology as for the other COPCs. However, since the toxicokinetics (the absorption, distribution, metabolism, and excretion of toxins in the body) of lead are well understood, lead risks are regulated based on PbB. In lieu of evaluating risk using typical intake calculations and toxicity criteria, EPA developed models which are used to predict PbB and the probability of a child's PbB exceeding 5 micrograms per deciliter (µg/dL) based on a given multimedia exposure scenario. EPA's risk reduction goal for lead-contaminated sites is to limit the probability of a typical child's (or that of a group of similarly exposed individuals') PbB exceeding 5 µg/dL to 5% or less. In the BHHRA, lead risks for Site receptors were evaluated using EPA's IEUBK Model for Lead in Children and the ALM model all other adolescent and adult receptors.

The soil EPCs for lead are arithmetic mean concentrations rather than the Upper Confidence Limits on the Mean (UCLs) that are used for other COPCs, to be consistent with the principles of the PbB models and the risk-based screening levels derived from those models. ~~The soil lead EPCs for 0 to 2 ft. bgs (outdoor worker, indoor worker, trespasser, resident), 0 to 4 ft. bgs. (utility worker), and all depths (outdoor worker, indoor worker, construction worker, trespasser, and resident) at each lot where actions are anticipated. The results~~ Soil EPCs for lead are summarized in Tables 4b and 4c and ~~. G~~groundwater EPCs for lead are presented in Table 4d.

Risk Characterization

This step summarizes the combined outputs of the exposure and toxicity assessments to provide a quantitative assessment of Site cancer risks, noncancer hazards, and PbBs. Exposures were evaluated based on the potential risk of developing cancer and the potential for noncancer hazards. Exposure from lead was evaluated using PbB modeling and is discussed in more detail later in this section.

Noncancer Hazards

Noncancer hazards were assessed using an HI approach, based on a comparison of expected contaminant intakes and benchmark comparison levels of intake (reference doses, reference concentrations). Reference doses (RfDs) and reference concentrations (RfCs) are estimates of daily exposure levels to chemicals for humans (including sensitive individuals) which are not anticipated to cause adverse health effects over a lifetime of exposure. The key concept for a noncancer HQ/HI is that a "threshold level" (measured as an HQ/HI of less than or equal to 1) exists at which noncancer health effects are not expected to occur. The estimated intake of chemicals identified in environmental media (*e.g.*, the amount of a chemical ingested from contaminated soil) is compared to the RfD, or airborne vapors that are compared to the RfC, to derive the HQ for the contaminant in the particular medium. The HI is obtained by adding the HQs for all compounds within a particular medium that impacts a particular receptor.

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The HQ for oral and dermal exposures is calculated as shown below. The HQ for inhalation exposures is calculated using a similar model that incorporates the RfC, rather than the RfD.

HQ = Intake/RfD

Where: HQ = Hazard Quotient
Intake = estimated intake for a chemical (mg/kg-day)
RfD = reference dose (mg/kg-day)

The intake and the RfD will represent the same exposure period (i.e., chronic, subchronic, or acute). The appropriate toxicity value was applied based on the exposure duration for the receptor.

As previously stated, the HI is calculated by summing the HQs for all chemicals for likely exposure scenarios for a specific receptor. An HI greater than 1 indicates that the potential exists for noncancer health effects to occur as a result of Site-related exposures, with the potential for health effects increasing as the HI increases. When the HI calculated for all chemicals for a specific receptor exceeds 1, separate HI values are then calculated for those chemicals which are known to act on the same target organ. These discrete HI values are then compared to the acceptable limit of 1 to evaluate the potential for noncancer health effects on a specific target organ. The HI provides a useful reference point for gauging the potential significance of multiple contaminant exposures within a single medium or across media. Following is a summary of the noncancer hazards identified at the Site for current and hypothetical future exposures:

Under current exposure scenarios for many receptors (outdoor workers, indoor workers, utility workers, ~~construction workers~~, trespassers, ~~visitors,~~ off-site workers ~~and residents~~) all noncancer HI estimates are at or below the protection goal of 1. For the current construction worker, a noncancer HI value of 2 was estimated for exposure to soil at all depths at Lot 68 (See Table 6-11 in the BHHRA); it should be noted that no TOSHI values exceeded the protection goal of 1 for this population (See Table 6-12 in the BHHRA). For the current visitor, a noncancer HI value of 2 was estimated for exposure to soil at all depths at Lot 70 (See Table 6-18 of the BHHRA); it should be noted that no TOSHI values exceeded the protection goal of 1 for this population (Table 6-19 in the BHHRA). For off-site residents, a noncancer value of 2 was estimated for exposure to on-site soil that may migrate off-site via windblown soil vapor and particulates emanating from lots without groundcover (See Table 6-24 in the BHHRA); it should be noted that no TOSHI values exceeded the protection goal of 1 for this population (Table 6-25 in the BHHRA).

Noncancer hazards for future scenarios are:

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~~based on potable use)~~For all lots, the HI values were greater than the goal of protection of 1 for outdoor worker's potential exposure to soil (0-2 feet) and exposure to shallow groundwater during hypothetical potable use, with the noncancer HIs ranging from 2 to 50. The target organ specific hazard indices (TOSHIs) are also above the goal of protection for Lots 57, 58, 63, 64, and 69. (See BHHRA Section 6.2.2.1, Table 6-32 and associated text.)

- For all lots, the HI values were greater than the goal of protection of 1 for indoor worker's potential exposure to soil (0-2 feet and all sample depths) and potential vapor intrusion exposure from shallow groundwater, with the noncancer HIs ranging from 2 to 50. The TOSHIs are also above the goal of protection for Lots 57, 58, 59, 61, 62, 63, 64, 65, 68 and 69. (See BHHRA Section 6.2.2.2, Table 6-41 and Table 6-42, and associated text.)
- For all lots, the HI values were greater than the goal of protection of 1 for outdoor/indoor/off-site workers' potential exposure to shallow and deep groundwater through ingestion, dermal contact, and inhalation of vapors during hypothetical potable use. Single-chemical hazard quotients (HQs) are above the goal of protection for several VOCs, SVOCs, and metals at each of the properties. ~~The highest HQ is for xylenes at Lots 58 and 59.~~ (See BHHRA Section 6.2.2.1, Table 6-30; Section 6.2.2.2, Table 6-40; and Section 6.2.2.7, Table 6-74.)
- The indoor worker's HIs for potential soil vapor intrusion exposure (from all sampled depths) ranged from 0.0004 to 5, with Lots 58, 62, 64, and 68 showing HIs above the goal of protection of 1. The single-chemical HQs above the goal of protection are trichloroethene (Lots 58 and 68), xylenes (Lots 58 and 64), naphthalene (Lot 62), and benzene (Lot 64). (See BHHRA Section 6.2.2.2, Table 6-33 and associated text.) The TOSHIs are above the goal of protection for Lots 58, 62 and 68 and are at or below the goal of protection for Lot 64. (See BHHRA Section 6.2.2.2, Table 6-34 and text associated with Table 6-33).
- Lot 68 had HIs greater than the goal of protection of 1 for the construction worker's potential exposure to soil (all sampled depths) (see BHHRA Section 6.2.2.4, Table 6-50) and potential exposure to shallow groundwater through ingestion, dermal contact, and vapor intrusion during future development (see BHHRA Section 6.2.2.4, Table 6-54). No single-chemical HQ (for soil) and no TOSHIs (for shallow groundwater) are above the goal of protection. (See BHHRA Section 6.2.2.4, text associated with Table 6-50 and Table 6-54.)
- For potential soil exposure (0-2 ft) and potential soil vapor intrusion for a child visitor at all lots, the HIs ranged from 0.2 to 3, with Lots 63 and 70 having HI values above the goal of protection of 1 (see BHHRA Section 6.2.2.6, Table 6-59). The single-chemical HQs are at or below the goal of protection, except for copper at Lot 63 (see BHHRA Section 6.2.2.6, text associated with Table 6-59). The TOSHIs are above the goal of protection for Lot 63 and at or below the goal of protection for Lot 70. (See BHHRA Section 6.2.2.6, Table 6-60 and associated text.)
- For potential exposure of visitors to soil (all sampled depths) brought to the surface during future development at all lots, the HIs ranged from 0.2 to 2, with Lots 63 and 70 having HI values above the goal of protection of 1 for a child visitor. The single-chemical HQs are at or below the goal of protection (see BHHRA Section 6.2.2.6, Table 6-61). The TOSHIs are above the protection goal for Lot 70 and are at or below the goal of protection for Lot 63. (See BHHRA Section 6.2.2.6, Table 6-62 and associated text.)
- For all lots, potential exposure to shallow and deep groundwater from ingestion, dermal

contact, and inhalation of vapors during hypothetical potable use showed HIs above the goal of protection of 1 for visitor/adult resident (range from 5 to 200) and for visitor/child resident (range from 7 to 200). The single-chemical HQs are above the goal of protection for several VOCs, SVOCs, PCBs, and metals at each of the properties, with the highest HQs for trichloroethene, xylenes, 1,2,4-trichlorobenzene, 2-hexanone, cyanide, naphthalene, and iron. The most elevated HI in Lot 59 is primarily from exposure to total xylenes. (See BHHRA Section 6.2.2.6, Table 6-67 and Section 6.2.2.9, Table 6-87.)

- For all lots, the potential exposure to soil (0-2 ft) and shallow groundwater from vapor intrusion and hypothetical potable use showed HIs above the goal of protection of 1 for adult visitor (ranging from 5 to 200) and for child visitor (ranging from 8 to 200). (See BHHRA Section 6.2.2.6, Table 6-68.)
- For all lots, the potential exposure to soil brought to the surface during future development and shallow groundwater from vapor intrusion and hypothetical potable use showed HIs above the goal of protection of 1 for adult visitor (ranging from 5 to 200) and for child visitor (ranging from 8 to 200). Generally, at least one TOSHI is also above the goal of protection at each property. (See BHHRA Section 6.2.2.6, Table 6-69 and associated text.)
- For all lots, the potential for off-site workers' exposure to soil (0-2 feet and all sampled depths) and contact with shallow groundwater during excavation, vapor intrusion, and hypothetical potable use showed His above the goal of protection of 1 (ranging from 2 to 50). The TOSHIs are also above the goal of protection for Lots 57, 58, 59, 61, 63, 64, and 69. (See BHHRA Section 6.2.2.7, Table 6-75 and Table 6-76, and associated text.)
- For all lots, potential inhalation exposure to soil (0-2 feet and all sampled depths) for off-site child resident, the HIs ranged from 0.02 to 2, with Lots 62 and 68 having His above the goal of protection of 1. No single-chemical HQs are above the goal of protection (See BHHRA Section 6.2.2.8, Table 6-77 and Table 6-79). All TOSHIs are at or below the goal of protection. (See BHHRA Section 6.2.2.8, Table 6-78 and Table 6-80, and associated text.)
- For all lots, for potential exposure to soil from ingestion, dermal contact, inhalation of particulates (0-2 ft), and inhalation of vapors (all sampled depths) for child resident, the HIs ranged from 2 to 20, except for Lot 59 which was at the goal of protection of 1. Single-chemical HQs for metals (Lots 58, 61, 63, 65, 67, 68, and 69), benzo(a)pyrene (Lot 67), naphthalene (Lot 62), PCBs (Lots 57, 65, 67, and 70), and 2,3,7,8-TCDD (Lots 60 and 70) are above the goal of protection of 1. Also, at Lot 63, the HI for adult resident was 2, above the goal of protection of 1, with all single-chemical HQs at or below the goal of protection. (See BHHRA Section 6.2.2.9, Table 6-81.)
- For all lots, for potential exposure to child resident to soil (all sampled depths) brought to the surface during future development from ingestion, dermal contact, and inhalation of particulates and vapors, the HIs ranged from 2 to 20, except for Lots 1 and 59 which were at the goal of protection of 1. Single-chemical HQs for metals (Lots 58, 61, 63, 65, 67, 68, and 69), naphthalene (Lot 62), PCBs (Lots 57, 65, 67, and 70), and 2,3,7,8-TCDD (Lots 60 and 70) are above the goal of protection of 1.Also, at Lot 70, the HI for adult resident was 2, above the goal of protection of 1, with all single-chemical HQs at or below the goal of protection. (See BHHRA Section 6.2.2.9, Table 6-82.)
- For all lots, for potential inhalation exposure to soil vapors (all sampled depths) in indoor air, the HIs ranged from 0.03 to 300 (except for Lots 59 and 69) for adult resident and from 0.04 to 500 (except for Lots 59 and 69) for child resident. The single-chemical HQs above

the goal of protection are benzene (Lots 1 and 64), tetrachloroethene (Lot 68), trichloroethene (Lots 58, 60, 61, 63, and 68), xylenes (Lots 58, 64, and 68), naphthalene (Lots 1, 57, 62, 63, 64, 65, 66, 67, 68, and 70), cyanide (Lots 63, 65, and 70), and mercury (Lots 1, 57, 58, 61, 62, 63, 64, 65, 66, 67, 68, and 70) for adult resident and/or child resident. (See BHHRA Section 6.2.2.9, Table 6-85.)

- For potential inhalation exposure to shallow groundwater vapors from vapor intrusion, the HIs for adult resident and child resident were 2, above the goal of protection of 1, at Lots 58 and 59. Single-chemical HQs for xylenes were above the goal of protection. (See BHHRA Section 6.2.2.9, Table 6-86.)
- For exposure from hypothetical potable use of shallow and deep groundwater, the HIs for the ~~resident~~ adult resident (~~greater than~~HI values ranging from 5 to 200) and child resident (~~greater than~~HI values ranging from -7 to 200) exceeded the goal of protection of 1. The single-chemical HQs are above the goal of protection for several VOCs, SVOCs, PCBs, and metals at each of the properties. The highest HQs ~~(i.e., HQ above 10)~~ are for trichloroethene, xylenes, 1,2,4-tricholobenzene, 2-hexanone, cyanide, naphthalene, and iron for adults and/or child. (See BHHRA Section 6.2.2.9, Table 6-87 and associated text; also see Table 6-88 for exposures to future residents from surface soil, inhalation of vapors released from soil (all sampled depths) and shallow groundwater from air vapor intrusion, and shallow groundwater from hypothetical potable use, and Table 6-89 for exposures to soil (all sampled depths), shallow groundwater from vapor intrusion, and shallow groundwater from hypothetical potable use.

A representative summary of the noncancer hazards discussed above is presented in Table 8; selected lots are shown as examples for specific receptor(s)/exposure scenarios. The complete presentation of all noncancer HI values can be found in the BHHRA Report, as identified parenthetically abov [redacted] Exemption 5, Deliberative, Attorney-Client [redacted]

Cancer Risks

For carcinogens, risks are generally expressed as the incremental probability of an individual developing cancer over a lifetime as a result of exposure to a carcinogen under the conditions described in the *Exposure Assessment*, using the cancer slope factor (SF) for oral and dermal exposures and the inhalation unit risk (IUR) for inhalation exposures. Excess lifetime cancer risk for oral and dermal exposures is calculated from the following equation, while the equation for inhalation exposures uses the modeled IUR, rather than the SF:

Risk = LADD x SF

Where: Risk = a unitless probability (e.g., 1 x 10^{-6}) of an individual developing cancer
LADD = lifetime average daily dose averaged over 70 years (mg/kg-day)
SF = cancer slope factor, expressed as [1/(mg/kg-day)]

These cancer risks are probabilities that are usually expressed in scientific notation (such as 1 x 10^{-4} of a cancer risk is one-in-ten thousand). An excess lifetime cancer risk of 1 x 10^{-4} indicates an estimate of one additional incidence of cancer may occur in a population of 10,000 people who are exposed under the conditions identified in the *Exposure Assessment*. Current NCP identifies the risk range for determining whether a remedial action is necessary as an individual lifetime excess cancer risk of 10^{-4} to 10^{-6} (corresponding to a one-in-ten-thousand to a one-in-a-million excess cancer risk), with 10^{-6} being the point of departure. Table 9 summarizes the estimated cancer risks that exceed EPA's target risk range of 1 x 10^{-6} to 1 x 10^{-4}. Following is a summary of the carcinogenic risks- identified at the Site for hypothetical future exposures that exceed the NCP risk range:

Under current exposure scenarios (outdoor workers, indoor workers, utility workers, construction workers, trespassers, visitors, off-site workers and residents), the cumulative cancer risk estimates are below or within NCP's risk range (10^{-4} to 10^{-6}).

Cancer risks for future scenarios are:

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For hypothetical potable use of shallow and deep groundwater by outdoor, indoor, and off-site workers, the cumulative cancer risks ranged from 1 x 10^{-4} to 7 x 10^{-4}, which is at or below the acceptable risk range. [redacted] Exemption 5, Deliberative, Attorney-Client

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[redacted] ee BHHRA Section 6.2.2.1, Table 6-30 for the outdoor worker, Section 6.2.2.2, Table 6-40 for the indoor worker, and Section 6.2.2.7, Table 6-74 for the off-site worker.)

- For all lots, the cumulative cancer risks were greater than the NCP's risk range for potential exposure of outdoor workers to surface soil (0-2 ft) and shallow groundwater during hypothetical potable use, ranging from 2 x 10^{-4} to 7 x 10^{-4}. (See BHHRA Section 6.2.2.1, Table 6-32,)
- For all lots, except Lot 70, the cumulative cancer risks were greater than the NCP's risk range for potential exposure of indoor workers to surface soil (0-2 ft) and shallow groundwater via vapor intrusion, ranging from 2 x 10^{-4} to 7 x 10^{-4}. The cumulative cancer risk for Lot 70 is at the higher end of the NCP's risk range (i.e., 10^{-4}). (See BHHRA Section 6.2.2.2, Table 6-41.)
- For all lots, tor potential exposure of indoor workers to soil (all sampled depths) and shallow groundwater via vapor intrusion, the cumulative cancer risks, ranging from 2 x 10^{-4} to 7 x 10^{-4}, were greater than NCP's risk range, except for Lot 67[redacted] (See BHHRA Section 6.2.2.2, Table 6-42.)
- For all lots, potential exposure of adult/child visitors to shallow and deep groundwater from ingestion, dermal contact, and inhalation of vapors during hypothetical potable use showed cumulative cancer risks above the NCP's risk range, ranging from 9 x 10^{-4} to 3 x 10^{-3}). (See BHHRA Section 6.2.2.6, Table 6-67.)
- For all lots, the potential exposure of adult/child visitors to soil (0-2 ft) and shallow groundwater from vapor intrusion and hypothetical potable use showed cumulative cancer risks above the NCP's risk range, ranging from 9 x 10^{-4} to 4 x 10^{-3}. (See BHHRA Section 6.2.2.6, Table 6-68.)
- For all lots, the potential exposure of adult/child visitors to soil brought to the surface during future development and shallow groundwater from vapor intrusion and hypothetical potable water use showed cumulative cancer risks above the NCP's risk range, ranging from 9 x 10^{-4} to 4 x 10^{-3}. (See BHHRA Section 6.2.2.6, Table 6-69.)
- For all lots, except Lots 62, 67, 68, and 70, cancer risks were greater than 1 x 10^{-4} for potential exposure of off-site workers to shallow groundwater through ingestion, dermal contact, and inhalation of vapors during hypothetical potable use, ranging from 2 x 10^{-4} to 7 x 10^{-4}. [redacted] The highest risks (i.e., above the upper end of the NCP's risk range [10^{-4}]) are for 1,2-dibromo-3-chloropropane, pentachlorophenol, dibenz(a,h)anthracene, and arsenic. (See BHHRA Section 6.2.2.7, Table 6-74.)
- For all lots, except Lots 67, 68, and 70, cancer risks were greater than 1 x 10^{-4} for potential exposure of off-site workers to soil (0-2 feet and all sampled depths) and shallow groundwater through contact during excavations, vapor intrusion, and hypothetical potable use (See BHHRA Section 6.2.2.7, Table 6-75 and Table 6-76.)
- For potential exposure of adult resident and resident child at all lots from ingestion, dermal

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contact, and inhalation of particulates (0-2 ft) and inhalation of vapors (all sampled depths), the cumulative cancer risks were at or within NCP's risk range, except for Lot 67 which was above the NCP's risk range at 2 x 10^{-4}. The single-chemical cancer risks are within the acceptable risk range for all contaminants. [redacted] Exemption 5, Deliberative, Attorney-Client (See BHHRA Section 6.2.2.9, Table 6-81.)

- For potential exposure of adult resident and resident child to indoor air from soil vapors (all sampled depths) through vapor intrusion and inhalation of vapors released from soil at all lots, except Lots 58, 59, 60, 61, 63, 65, 66 and 69, the cumulative cancer risks were above the NCP's risk range, ranging from 4 x 10^{-4} to 1 x 10^{-2}. [redacted] Exemption 5, Deliberative, Attorney-Client (See BHHRA Section 6.2.2.9, Table 6-85.)
- For all lots, the potential exposure of resident adults and resident child to shallow and deep groundwater during hypothetical potable use showed cancer risks above the NCP's risk range, ranging from 9 x 10^{-4} to 4 x 10^{-3}. The single-chemical cancer risks are above the lower end of the NCP's risk range (10-6) for several VOCs, SVOCs, PCBs, and metals at each of the properties. The highest cancer risks (i.e., above the upper end of the NCP's risk range [10^{-4}]) are for 1,3-dihloropropene (total), 1,2-dibromo-3-chloropropane, benzene, vinyl chloride, pentachlorophenol, benzo(a)pyrene, dibenz(a,h)anthracene, naphthalene, and arsenic. (See BHHRA Section 6.6.2.9, Table 6-87.)
- For all lots, the potential exposure of adult resident and resident child to soil (0-2 ft and all sampled depths), inhalation of vapors released from soil (all sampled depths) and shallow groundwater via vapor intrusion, and shallow groundwater from hypothetical potable use showed cancer risks above the NCP's risk range, ranging from 1 x 10^{-3} to 1 x 10^{-2}). (See BHHRA Section 6.6.2.9, Table 6-88 and Table 6-89.)~~.~~

A representative summary of the cancer risks discussed above is presented in Table 9. selected lots are shown as examples for specific receptor(s)/exposure scenarios. The complete presentation of all cancer risks can be found in the BHHRA Report~~A representative summary of the cancer risks discussed above is presented in Table 9. The complete presentation of all cancer risks can be found in the BHHRA Report~~.

Estimated PbBs and Estimated Percentage of PbBs > 5 ug/dL

As summarized in the table below, the Region 2 goal for lead in non-residential soil (consistent with the reasonably anticipated future use of this Site is commercial/industrial) was exceeded for a number of receptors on individual lots. The following table summarizes lots with average soil Pb concentrations greater than 800 mg/kg and for which there is a greater than 5 percent probability that PbBs for current receptors would exceed 5 µg/dL. As discussed above, the IEUBK and ALM models were used to estimate the probabilities.

Lot #	Timeframe	Receptors	Soil Depth (ft.bgs)	Average Soil Lead Concentration (mg/kg)	Percentage PbBs Exceeding 5 µg/dL	BHHRA Table #
70	Current	Outdoor Workers	0 to 2	934	7.7	6-2
63	Current	Construction Workers	0 to 13	2,530	81	6-13
70	Current	Construction Workers	0 to 17	970	28	6-13
63	Current	Trespassers (Assuming adult outdoor worker exposure assumptions).	0 to 2	2,080	38	6-17
70	Current	Trespassers (Assuming adult outdoor worker exposure assumptions).	0 to 2	934	7.7	6-17
70	Current	Current Child Visitor	0 to 2	934	8.5	6-22

bgs = below ground surface
ft = feet

For future receptors, the following table summarizes lots with average soil Pb concentrations greater than 800 mg/kg and where there is a greater than 5 percent probability that PbB levels would exceed 5 µg/dL.

Lot #	Timeframe	Receptors	Soil Depth	Average Soil Lead Concentration (mg/kg)	Percentage PbB Levels Exceeding 5 µg/dL	BHHRA Table #
63	Future	Outdoor Workers	0 to 2	2,080	38	6-28
70	Future	Outdoor Workers	0 to 2	934	7.7	6-28
63	Future	Outdoor Workers	All Sampled Depths	2530	49	6-29

70	Future	Outdoor Workers	All Sampled Depths	970	8.4	6-29
63	Future	Indoor Worker	0 to 2	2080	23.0	6-38
63	Future	Indoor Worker	All Depths	2530	32.0	6-39
63	Future	Construction Worker	All Depths	2130	81.0	6-52
70	Future	Construction Worker	All Depths	970	28.0	6-52
63	Future	Trespasser	0 to 2	2080	38.0	6-57
70	Future	Trespasser	0 to 2	934	7.7	6-57
63	Future	Trespasser	All Depths	2530	49.0	6-58
70	Future	Trespasser	All Depths	970	8.4	6-58
63	Future	Child Visitor	0 to 2	2080	23.7	6-63
70	Future	Child Visitor	0 to 2	934	8.5	6-63
63	Future	Child Visitor	All Depths	2530	30.3	6-64
70	Future	Child Visitor	All Depths	970	8.9	6-64
63	Hypothetical Future	Child	0 to 2	2080	95.9	6-83
70	Hypothetical Future	Child	0 to 2	934	68.6	6-83

63	Hypothetical Future	Child	All Depths	2,530	97.9	6-84
70	Hypothetical Future	Child	All Depths	970	70.7	6-84

*Other properties with lead concentrations less than 800 mg/kg and the probability that PbB levels exceed 5 ug/dL are Lots 61, 64, and Lot 68. Only properties meeting the criteria of average soil Pb concentrations greater than 800 mg/kg and a greater than 5 percent probability that PbB levels exceed 5 ug/dL are included in these tables.

In addition to soil exposures, the Action Level for lead in drinking water of 15 ug/L (40 CFR Part 141 Subpart I) was exceeded in groundwater samples collected at Lots 57, 60, 63, 64, 67, and 69. Lead concentrations in the shallow groundwater unit exceeded NJDEP Class IIA standards (5 ug/L) in wells located on Lots 57, 60, 61, 63, 64, 66, and 67.

Uncertainties

Uncertainties are addressed by making health-~~-~~protective assumptions concerning cancer risk, noncancer hazards, and exposure parameters throughout the assessment. As a result, the risk assessment provides upper-bound estimates of the risks and hazards to receptor populations and is unlikely to underestimate actual cancer risks and noncancer hazards.

The procedures and inputs used to assess cancer risks and noncancer hazards in this evaluation, as in all such assessments, are subject to uncertainties. In general, the main sources of uncertainty include:

- Environmental chemistry sampling and analysis;
- Environmental parameter measurement;
- Fate and transport modeling;
- Exposure parameter estimation; and,
- Toxicological data.

Environmental chemistry sampling and analysis. Uncertainty in environmental sampling arises in part from the potentially uneven distribution of chemicals in the media sampled. Consequently, there is significant uncertainty as to the actual levels present. Environmental chemistry-analysis error can stem from several sources including the errors inherent in the analytical methods and characteristics of the matrix being sampled. However, EPA follows Quality Assurance/Quality Control procedures in sampling and evaluation of data to reduce uncertainties.

Only detected chemicals were used to determine COPCs, which potentially underestimates cancer risks and noncancer hazards if chemicals are present at concentrations below the sample quantitation limits (SQLs). For chemicals that were not detected in a matrix (soil, groundwater, and indoor air), the SQLs were compared to the risk based screening levels to determine if additional COPCs would be identified assuming chemicals would be present at concentrations below the SQLs. While some SQLs for chemicals not detected in a matrix exceeded risk based screening levels (mostly semivolatile organic compounds (SVOCs) in groundwater), the expected magnitude of this uncertainty is anticipated to be low.

EPCs were calculated based on available data that resulted in the calculation of a 95% UCL on the arithmetic mean or the maximum concentration. Further analysis was conducted to evaluate if the dataset included a hot spot. If a hot spot (areas of very high contaminant concentrations relative to other areas of a site) is located near an area which, because of the site or population characteristics, is visited more frequently, exposure to the hot spot is assessed separately from the calculation of the EPCs consistent with EPA's ProUCL[10] guidance. For the BHHRA, the potential for hot spots at each of the 15 properties was evaluated. The results of the hot spot analysis did not affect the conclusions of the risk assessment, except for lead at Lot 64 (Sample B-75 from 1 to 3 ft. bgs, which is adjacent to Lot 63), which could affect the conclusions for future outdoor worker exposure to lead. This analysis for Lot 64 was based on the average Pb concentration consistent with the lead methodology outlined above. Non-detected and rejected results for COPCs were also reviewed and determined unlikely to impact the conclusions of the risk assessment. Conservative assumptions related to off-site air modeling likely overestimate exposure to the RME individual.

Exposure parameter estimation. Uncertainties in the exposure assessment are related to estimates of how often an individual would actually come in contact with the COCs, the period of time over which such exposure would occur, and in the models used to estimate the concentrations of the COCs at the point of exposure.

- *Exposure Factors.* Health protective assumptions related to utility worker and construction worker soil ingestion rates, trespassers' exposure frequency, the visitor receptor including a young child (younger than 6 years) and the child visitors' exposure frequency, may over or underestimate RME exposures. Cumulative cancer risk and noncancer HI estimates for soil and groundwater are summed to account for potential concurrent exposures to both media (e.g., utility or construction worker exposure to both soil and groundwater during excavations). The exposures to both soil and groundwater are calculated at the magnitudes, frequencies, and durations assumed for each medium and the cancer risks and HI are then summed to determine the combined cumulative cancer risk and combined noncancer HI. This summation may overestimate the RME (e.g., a utility worker's skin cannot be completely covered with soil and groundwater at the same time or future residents cannot be inside and outside at the same time). The evaluation of combined cumulative cancer risk and combined noncancer HI did not affect the conclusions of the BHHRA.

- *Lead.* Uncertainties related to lead screening levels for both the nonresidential screening level of 800 mg/kg and the residential screening level of 200 mg/kg may over- or underestimate lead hazards. Uncertainties in the application of the ALM model to worker exposure including a discussion of potential overestimates of the lead exposures are provided in the BHHRA Section 6.3.4). Uncertainties associated with the lead assessment for child visitors also may over- or underestimate lead exposures.

Toxicological data. Uncertainties in toxicological data occur in extrapolating both from animals to humans and from high to low doses of exposure, as well as from the difficulties in assessing the toxicity of a mixture of chemicals. Another uncertainty is the lack of toxicity data for several of the chemicals that may underestimate the cancer risk and noncancer hazards.

[10] ProUCL is a comprehensive statistical software package initially developed by EPA for computing statistical intervals to respond to concerns at a specific Superfund site.

- *Toxicity Values.* Use of dermal toxicity values extrapolated from oral toxicity values may overestimate or underestimate cancer risk and noncancer HI estimates. Some COCs lack toxicity values, which may underestimate cancer risk and noncancer HI estimates. Uncertainties related to the ratio of hexavalent and trivalent chromium that chromate workers were exposed in the study used to derive the inhalation URF were evaluated and determined to only marginally change the conclusions of the risk assessment since inhalation exposure to hexavalent chromium only occurs from soil particulate inhalation (i.e., chromium is not volatile).

- Uncertainties related to using ~~the~~ EPA's IRIS weight of evidence classification for ethylbenzene, which classifies ethylbenzene as a noncarcinogen, were evaluated using California EPA cancer toxicity values. Using CalEPA's cancer toxicity values for ethylbenzene was determined to only marginally change the conclusions of the risk assessment.

- The single-chemical residential soil vapor intrusion HQs for mercury and cyanide are above the noncancer protection goal of 1 for several properties. The use of an RfC for mercury and cyanide assumes that these metals are present in the volatile forms (i.e., elemental mercury and hydrogen cyanide). The types of mercury and cyanide present in the fill or used at the Site are unknown, and the analytical methods measure total concentrations which could consist of various forms of inorganic mercury and cyanide. The use of an RfC to assess total mercury and total cyanide is health protective and may overestimate noncancer hazards from vapor inhalation depending on the form of mercury and cyanide present at the Site.

Screening-level Ecological Risk Assessment

A SLERA was conducted and focused on the potential for terrestrial exposure from on-site surface soil/fill material. Approximately 70% of the Site is covered with impervious surfaces, such as asphalt. The remaining 30% of the Site contains pervious areas that may support potential ecological habitat. The habitat present on the Site is fragmented and of low value to wildlife with opportunistic, invasive, and transient species, such as the Japanese knotweed, being the dominant species observed or expected to be on the property. Although groundwater at the Site discharges to the Passaic River through the sediment, there are no groundwater discharges to the surface soil/fill material; therefore, the groundwater ecological exposure pathway was determined to be incomplete for the terrestrial portion of the Site.

Primary exposure pathways include direct contact (e.g., plant roots and soil invertebrates), soil ingestion (e.g., earthworms), incidental soil ingestion (e.g., preening by birds), and ingestion of soil invertebrates and small mammals. For wildlife, prey ingestion is assumed to dominate exposure. Due to the limited, fragmented, and low-quality ecological habitat available on-site and the proximity to active industrial and commercial operations, it is unlikely that federal-listed or state-listed sensitive species would be present on-site. The likely future use of this Site is to remain developed for commercial/industrial purposes and redevelopment of any portion of the Site will remove or alter the existing ecological resources in that area.

Potential river sediment impacts from site operations will be addressed through implementation of the Diamond Alkali Superfund Site, Lower 8.3 Miles ROD, which includes river-wide dredging of surface sediment to accommodate a bank to bank engineered sediment cap.

Based on the results of the SLERA, the primary terrestrial ecological pathway is contaminated surface soil/fill material. The SLERA identified this pathway as being related to unacceptable ecological risk. Chemicals of potential ecological concern (COPECs) identified in surface soil included several VOCs, PAHs and other SVOCs, one pesticide (heptachlor epoxide), PCBs, dioxin, and several metals. These compounds were identified using stringent comparison values and given the lack of quality habitat, the overall ecological risk is likely overestimated in the SLERA. In lieu of conducting an additional, more in-depth ecological evaluation for the Site, EPA has made a management decision that the remedial alternatives will address the potentially unacceptable ecological risks identified in the SLERA.

Basis for Taking Action

Based on the results of the RI/FS, including the risk assessments, EPA has determined that the response action selected in this ROD is necessary to protect the public health or welfare or the environment from actual or threatened releases of hazardous substances into the environment.

REMEDIAL ACTION OBJECTIVES

Remedial action objectives (RAOs) are specific goals to protect human health and the environment. These objectives are based on available information and standards, such as applicable or relevant and appropriate requirements (ARARs), advisories, criteria and guidance to-be-considered (TBCs),[11] and Site-specific risk-based levels.

The following RAOs were established for the Site for contaminants of concern (COCs):

Waste

- Secure or remove wastes that act as a source of COCs to other media to the extent practicable.
- Prevent uncontrolled movement of COCs in wastes (i.e., spills and free-phase liquid) that may impact other media.
- Minimize or eliminate human and ecological exposure to NAPL.

Sewer Water

- Prevent exposure to COCs in sewer water and solids associated with a release from the inactive sewer system.
- Minimize concentrations of COCs in sewer water (inactive system).
- Prevent or minimize discharge of sewer water COCs to surface water to minimize the potential for interaction between the Site and the Passaic River.

[11] TBCs are advisories, criteria, or guidance that were developed by EPA, other federal agencies, or states that may be useful in developing CERCLA remedies. TBCs are generally used to develop PRGs in the absence of ARARs.

Soil Gas

- Minimize contaminant levels in sources of COCs in soil gas that may migrate to indoor air.
- Prevent exposure to COCs in indoor air ~~that pose~~if unacceptable risk is found as a result of building assessments.

[redacted]

Soil/Fill

- Remove COCs or minimize COC concentrations and eliminate human exposure pathways to COCs in soil and fill material.
- Remove COCs or minimize COC concentrations and eliminate or minimize ecological exposure pathways to COCs in soil and fill material.
- Prevent or minimize off-site transport of soil containing COCs to minimize the potential for interaction between the Site and the Passaic River.
- Prevent or minimize potential for leaching of COCs to groundwater and surface water from soil and fill.

Groundwater

- Minimize COC concentrations and restore groundwater quality.
- Prevent exposure to COCs in groundwater.
- Prevent or minimize migration of groundwater containing COCs.
- Prevent or minimize discharge of groundwater containing COCs to surface water to minimize the potential for interaction between the Site and the Passaic River.

Remediation goals

Remediation goals (RGs) are chemical-specific, quantitative goals that are intended to be protective of human health and the environment and meet RAOs. RGs were developed for soil/fill material, soil gas, and groundwater based on ARARs, TBCs and risk-based concentrations (RBCs)[12] with consideration of current and reasonably anticipated future use, background concentrations, analytical detection limits, guidance values, and other available information. Furthermore, RGs were only established for site-related contaminants. The RGs selected and discussed below are protective of human health and ecological exposures[13] that are expected to be associated with the Site.

Waste and Sewer Water

No RGs have been developed for sewer water or waste. These media are discussed in more detail in the Description of Remedial Alternatives section. Soil/fill material surrounding the USTs that is impacted by LNAPL (diesel fuel/heating oil) will be evaluated and compared to NJDEP extractable petroleum hydrocarbon (EPH) promulgated requirements and delineated per NJDEP guidance.

[12] RBCs for human health and ecological receptors are derived for chemicals in each receptor scenario identified in the BHHRA and SLERA as posing risk/hazard in excess of EPA acceptable levels.
[13] Given the lack of ecological habitat and the anticipated future industrial use of the Site, the remediation goals selected were determined to be protective of ecological populations that may occasionally use the limited habitat on the Site as part of foraging or home ranges.

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Soil Gas

For soil gas, EPA determined that the direct contact soil RGs mentioned above would not be protective of the vapor intrusion pathway for TCE, total xylenes and naphthalene. The BHHRA did not indicate unacceptable cancer risks/hazards for these COCs based on direct contact; however, there was a potential for an unacceptable risk or hazard for inhalation from the VOC concentrations in the soil, based on air concentrations that were modeled from soil concentrations, and estimating risk/hazard from exposure to the modeled air concentrations. Therefore, the RBCs for TCE, total xylenes, and naphthalene that take into account volatilization from soil into indoor air are selected as the RGs, as follows (see Table 10 in Appendix II):

- Xylenes – the RBC is based on a noncancer HI = 1 since no cancer toxicity value is available for this compound. The RBC RG for total xylenes is 6.5 mg/kg.
- TCE and Naphthalene – the RBCs based on a 1 x 10^{-6} cancer risk were compared to the noncancer hazard-based RBC, and the lower of the two values was selected. The RBC RG for TCE is 0.02 mg/kg and for naphthalene is 0.62 mg/kg.

The BHHRA vapor intrusion modeling indicated that there were no unacceptable health risks/hazards (modelled from shallow groundwater concentrations). However in the RI, a comparison of the shallow fill unit data to EPA and NJDEP~~'s~~ VISLs ~~Guidance~~ identified benzene, ethylbenzene, total xylenes, 1,3-dichloropropene (total), TCE, and vinyl chloride at concentrations above either the EPA and/or NJDEP VISL~~ levels~~. Under NJDEP's VIT guidance, a~~A~~n exceedance of a VISL ~~would~~ triggers the need to perform an investigation for all ~~an occupied~~ buildings within 100 feet of the monitoring well. To evaluate the vapor intrusion pathway in the future, VOC concentrations in shallow groundwater will be sampled and compared to VISL per the guidance.[14,15]

No RG~~s~~ was~~ere~~ developed for 1,3-dichloropropene (total) ~~VISL exceedances~~ in groundwater because there was only one reported exceedance at the Site.

Soil/Fill

RGs for soil/fill material were developed by comparing RBCs to NJDEP NRDCSRS to determine the appropriate remediation goals for the Site. For this Site, NRDCSRS were identified based on the reasonably anticipated use of the Site as commercial/industrial. The more conservative of the RBCs and the NRDCSRSs were identified as the chemical-specific soil RGs (Table 10 in Appendix II).

For lead, RBCs range from 441 mg/kg to 3,292 mg/kg based on the ALM for adult receptors and the IEUBK Model for the child visitor receptor; the NRDCSRS for lead is 800 mg/kg, and the representative historic fill average value is 574 mg/kg. Of these values, a risk management decision was made to select the NRDCSRS of 800 mg/kg as the RG for lead. This concentration is similar

[redacted]

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[redacted]

14 The NJDEP Vapor Intrusion Technical Guidance (VIT) can be found at https://www.state.nj.us/dep/srp/guidance/vaporintrusion/

15 EPA's guidance can be found at: https://19january2017snapshot.epa.gov/vaporintrusion/vapor-intrusion-screening-levels-visls.html

to the RBC for the outdoor worker and adequately protective of both the indoor worker and utility worker receptors. While lower RBCs were derived for the child visitor and construction worker scenarios, these values were not selected as RGs because: 1) the child visitor scenario, which assumed both indoor and outdoor routine exposures to a young child, is an unlikely scenario for an industrial property that is now and likely in the future to be largely paved/covered, and the higher intensity soil/fill exposures assumed for this young receptor are anticipated to be more limited if the child is accompanied by an adult; and 2) while a construction worker scenario is plausible considering the potential for redevelopment of the Site, EPA expects that exposures to lead during any future excavation work will be recognized and managed appropriately as part of the selected remedy.

For copper, the RBC of 526 mg/kg based on the child visitor scenario is substantially lower than the ARAR of 45,000 mg/kg, which is the NRDCSRS for copper. As discussed, the child visitor scenario is an unlikely, conservative scenario. High intensity outdoor soil/fill exposures are uncertain based on the industrial zoning of the Site. The BHHRA identified an HI greater than 1 for the child visitor scenario at only Lot 63; it is noted that the EPC for copper at this lot is driven primarily by one sample location (B-33), which is also co-located with an elevated lead concentration that exceeds the lead RG, and thus, will be addressed as part of the remedy. Use of the NRDCSRS as a cleanup objective may not be adequately protective of non-residential receptors if health risk is based on the oral RfD used in the BHHRA, given the 40-fold difference in toxicity values between those used to derive the NRDCSRS (0.04 mg/kg/day) and the RBC (0.001 mg/kg/day). Thus, the RBC of 526 mg/kg is conservatively selected as the RG for copper.

[redacted]

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No RGs were developed for the iron and manganese NRDCSRS exceedances in soil/fill because these metals are naturally occurring in soil and there was only one reported exceedance of the RBC at the Site.

Groundwater

EPA and NJDEP have promulgated maximum contaminant levels (MCLs), and NJDEP has promulgated groundwater quality standards (GWQSs), which are enforceable, health-based, protective standards for various drinking water contaminants. For the Site, NJDEP GWQS are equal to, or more stringent than the MCLs and have been identified as ARARs and selected as the RGs for site-related COCs in groundwater because the groundwater is classified by the State of New Jersey as a Class IIA aquifer (Table 11 in Appendix II).

1,1,2-Trichloroethane concentrations exceed the NJDEP GWQS in multiple monitoring wells on Lot 63 and Lot 64. 1,1,2-Trichloroethane was detected in shallow groundwater monitoring wells surrounding the USTs, but not detected in the UST contents possibly due to elevated reporting limits. It should be noted that while the presence of 1,1,2-trichloroethane could not be confirmed in the USTs, the elevated reporting limits for 1,1,2-trichloroethane were above the GWQS of 3 ug/L in six of the seven tanks. The presence of 1,1,2-trichloroethane will be confirmed during the remedial design in the USTs and shallow groundwater.

No RGs were developed for the following groundwater constituents, even though they exceed NJDEP MCLs, or GWQS, because these constituents are naturally occurring in groundwater that is tidally impacted or do not appear to be associated with known on-site activities:

- Aluminum: Naturally occurring in groundwater
- Antimony: Mostly non-detected with four exceedances (MW-105, MW-101, MW-103, and MW-120) that are 1x to 3x NJDEP GWQS
- Arsenic: Mostly low-level detections; site-wide contaminant in shallow and deep groundwater
- Barium: Mostly low-level detections with one exceedance (MW-116) that is 2x the NJDEP GWQS
- Beryllium: Mostly non-detected with three low-level detections that exceed the NJDEP GWQS
- Cadmium: One exceedance at MW-110
- Iron: Naturally occurring in groundwater
- Manganese: Naturally occurring in groundwater
- Methyl ethyl ketone: One exceedance at MW-117
- Selenium: Mostly low-level detections with three exceedances (MW-116, MW-106, MW-101) that are 1x to 2x NJDEP GWQS
- Sodium: Naturally occurring in groundwater that is tidally influenced
- Dibromo-3-chloropropane, 1,2-: One exceedance at MW-121
- Dichloropropene, 1,3-: One exceedance at MW-122
- Hexanone, 2-: One exceedance at MW-122
- Tetrachloroethane, 1,1,2,2-: One exceedance at MW-203
- Trichlorobenzene, 1,2,4-: One exceedance at MW-122
- Pentachlorophenol: One exceedance in MW-107

DESCRIPTION OF REMEDIAL ALTERNATIVES

CERCLA Section 121(b)(1), 42 U.S.C. § 9621(b)(1), mandates that remedial actions be protective of human health and the environment, cost-effective, and utilize permanent solutions and alternative treatment technologies and resource recovery alternatives, to the maximum extent practicable. Section 121(b)(1) also establishes a preference for remedial actions which employ, as a principal element, treatment to permanently and significantly reduce the toxicity, mobility or volume of the hazardous substances, pollutants and contaminants at a site. CERCLA Section 121(d), 42 U.S.C. § 9621(d), further specifies that a remedial action must attain a level or standard of control of the hazardous substances, pollutants, and contaminants, which at least attains ARARs under federal and state laws, unless a waiver can be justified pursuant to CERCLA Section 121(d)(4), 42 U.S.C. § 9621(d)(4). Detailed descriptions of the remedial alternatives for addressing the contamination at the Site can be found in the FS Report, dated July 2020.

The remedial alternatives are summarized below. The construction time for each alternative reflects only the time required to construct or implement the remedy and does not include the time required to design the remedy, negotiate the performance of the remedy with any potentially responsible parties, or procure contracts for design and construction. The "no-action" alternative was evaluated for all media because the NCP requires that the "no-action" alternative be considered as a baseline for comparison against other alternatives. Capital costs are based on 2020 dollars. The present worth calculation assumes that construction would begin in 2022 and assumes a 7 percent discount rate.

Waste Alternatives

Waste Alternative 1: No Action

Capital Cost:	$0
Annual OM&M Cost:	$0
Present Worth Cost:	$0
Construction Time:	0 months

Under this alternative, no action would be taken. This alternative is retained for comparison with the other alternatives as required by the NCP. Under no action, remaining source materials at the Site would be left in place, and no means of securing the materials to prevent future release to the environment would be implemented.

Waste Alternative 2: Removal and Off-Site Disposal

Capital Cost:	$1,798,211
Annual OM&M Cost:	$0
Present Worth Cost:	$1,580,700
Construction Time:	1-2 months

This alternative focuses on removal of principal threat waste along with removal of the various small volume wastes found across the Site to prevent an uncontrolled release to the environment. This alternative includes the removal of a chalky talc-looking substance in Building #7, a plastic 55-gallon drum in Building #12, a five-gallon bucket in Building #17, the USTs on Lot 64, the waste and/or LNAPL within the USTs, NAPL-impacted soil/fill material surrounding the USTs, and the LNAPL in the pooled water in Building #15A. These wastes will then be properly disposed at an off-site facility; if required by the facility, the waste may need to be treated. The LNAPL in the UST and Building #15A are considered principal threat wastes, and the removal and disposal of these wastes will address this concern. Upon removal of USTs and their contents, confirmation soil/fill (including underneath the tank) and groundwater sampling will occur consistent with substantive requirements of New Jersey tank closure regulations (N.J.A.C. 7:14B) and NJDEP Technical Requirements for Site Remediation (N.J.A.C. 7:26E-5.1(e)).

It is assumed that approximately 3,500 CY of NAPL-impacted soil/fill adjacent to the USTs would require excavation and off-site disposal as part of this alternative. It is anticipated that excavation will extend 13 ft bgs. Note that removal of NAPL-impacted soil/fill on Lot 63, not directly associated with UST removal on Lot 64, is addressed in the soil/fill alternatives.

The total volume of liquid waste estimated to be removed for off-site disposal is approximately 40,000 gallons consisting of: 55 gallons of waste from Buildings #12 and #17; 2,900 gallons of LNAPL in Building #15A; 1,600 gallons of LNAPL in the UST; and approximately 32,600 gallons of liquid and 2,600 gallons of settled solids in the USTs (total amount). The total volume of solid waste estimated to be removed is approximately 3,511 CY, consisting of 11 CY in Building #7 and 3,500 CY of NAPL-impacted soil/fill associated with the UST removal and closure.

Sewer Water Alternatives

Sewer Water Alternative 1 – No Action

Capital Cost:	$0
Annual OM&M Cost:	$0
Present Worth Cost:	$0
Construction Time:	0 months

Under this alternative, no action would be taken. This alternative is retained for comparison with the other alternatives as required by the NCP. Under no action, the water and solids in the designated section of sewer and associated line would be left in place, and no means of securing the materials to prevent future release to the environment would be implemented.

Sewer Water Alternative 2 – Removal and Off-Site Disposal

Capital Cost:	$27,981
Annual OM&M Cost:	$0
Present Worth Cost:	$24,900
Construction Time:	1 month

This alternative consists of transferring the sewer water and solids (approximately 0.75 CY) from the inactive sewer line into appropriate containers or transport vehicles for off-site treatment and/or disposal along with proper closure of the line. Liquid materials would be pumped into drums and transferred to an appropriate facility for treatment and disposal. Remaining solids in the manhole would be placed into a drum and disposed in an appropriate solid waste landfill. The waste may need to be treated prior to disposal if required by the disposal facility.

Upon removal of the contents, the interior of the manhole and associated line would be cleaned and then closed in place by plugging/filling to prevent future buildup of water and solids in the manhole. Cleaning of the manhole and the one unplugged pipe (estimated to be 125 linear feet) would generate an estimated 2,500 gallons of additional liquid.

Soil Gas Alternatives

Soil Gas Alternative 1 – No Action

Capital Cost:	$0
Annual OM&M Cost:	$0
Present Worth Cost:	$0
Construction Time:	0 month

Under this alternative, no action would be taken. This alternative is retained for comparison with the other alternatives as required by the NCP. Under no action, no measures would be taken to protect future indoor workers from exposure to soil vapors.

Soil Gas Alternative 2 – Institutional Controls, Air Monitoring or Engineering Controls (existing occupied buildings) and Site-Wide Engineering Controls (future buildings)

Commented [SJ55]: Please review

Capital Cost:	$123,525
Annual OM&M Cost:	$31,500
Present Worth Cost:	$449,800
Construction Time:	1-2 months

This alternative consists of establishing or enhancing deed notices to provide notice of certain restrictions upon the use of the property. Such restrictions would require that existing buildings have a building-specific assessment of sub-slab soil gas and/or indoor air quality performed and, if the assessment identified unacceptable risks/hazards, engineering controls approved by EPA, to protect occupants from unacceptable vapor intrusion risks/hazards associated with the COCs present in soil/fill material (TCE, total xylenes, and naphthalene). The assessments would be implemented for currently occupied buildings (Buildings #1, #2, #3, #9, #10, #14, and #16) and prior to future occupation of existing buildings.

Exemption 5, Deliberative, Attorney-Client [redacted] ~~.~~ During remedial design, in addition to TCE, total xylenes and naphthalene, the potential for vapor intrusion associated with benzene, ethyl benzene ~~1,3-dichloropropene (total)~~, and vinyl chloride would be investigated in all buildings that are within 100 feet of the monitoring well where these VOCs were detected. ~~,~~ The VOC concentrations in shallow groundwater will be sampled and compared to VISL per NJDEP VIT guidance.[16]

Exemption 5, Deliberative, Attorney-Client [redacted]

For newly constructed buildings on the Site, requirements include construction of a vapor barrier or other appropriate means of sealing the ground surface underneath the new building slab, or installation of a subsurface depressurization system (SSDS), as approved by EPA.

In addition to the initial assessments, periodic indoor air monitoring would be required in existing, occupied buildings (this currently includes Buildings #1, #2, #3, #9, #10, #14, and #16) and any existing building occupied in the future. Air monitoring is necessary to confirm previous BHHRA results and/or to ensure the indoor workers are protected, due to the presence of VOCs in Site media. Monitoring may also be required for newly constructed buildings with engineering controls, but less frequent monitoring is anticipated. Engineering controls (such as a SSDS) could also be implemented for existing buildings, though it should be noted that the use of SSDS would not eliminate the need for air monitoring~~,~~ but may reduce its frequency. If air monitoring indicates vapor intrusion is occurring at levels that exceed the EPA VISLs, an evaluation of the data would be necessary to determine whether unacceptable risk exists and, if so, the property owners or

[16] https://www.nj.gov/dep/srp/guidance/vaporintrusion/vit_main.pdf?version_5

~~responsible~~ parties would be required to implement engineering controls to achieve New Jersey indoor air standards as remediation goals.

Establishing or enhancing deed notices is an element of the Soil Remedial Alternatives; the requirements for soil gas could be captured in such deed notices, together with the requirements for soil/fill.

Soil Gas Alternative 3 – Institutional Controls, Air Monitoring or Engineering Controls (future buildings), and In-Situ Remediation of Soil/fill (existing occupied buildings)

Capital Cost:	$4,591,968
Annual OM&M Cost:	$0
Present Worth Cost:	$4,050,800
Construction Time:	4-6 months (for initial round of injection)

This alternative includes the same institutional controls, periodic air monitoring, and/or engineering controls (such as SSDS), for both existing, currently occupied or to be occupied Site buildings, and for future construction, to protect building occupants from exposure to VOCs in soil gas as described for Soil Gas Alternative 2. During remedial design, potential vapor intrusion associated with the VOCs detected in groundwater would be investigated in buildings that are within 100 feet of the monitoring well where the VOCs were detected, consistent with NJDEP VIT guidance as described for Soil Gas Alternative 2.

This alternative also includes in-situ remediation of soil/fill containing TCE, and total xylenes~~, and naphthalene~~ above the RGs within 100 feet of existing occupied buildings. This alternative assumes a remedial footprint of 1.95 acres with an estimated depth to groundwater of 6 feet for a total of 18,900 CY. In-situ remediation of the designated soil/fill would be performed using chemical oxidation injection. Remaining soil/fill with VOCs above the associated RGs (but not within 100 feet of existing occupied buildings) would be addressed by the institutional controls requiring assessment and, if needed, mitigation prior to occupancy of existing buildings, and site-wide engineering controls for future construction.

Soil/Fill Alternatives

Soil/Fill Alternative 1 – No Action

Capital Cost:	$0
Annual OM&M Cost:	$0
Present Worth Cost:	$0
Construction Time:	0 month

Under this alternative, no action would be taken. This alternative is retained for comparison with the other alternatives as required by the NCP. Under no action, new deed restrictions and other institutional controls would not be implemented, and future use of the subject areas would be unrestricted, except that existing NJDEP-approved institutional and engineering controls would remain in place although they would not be enforced by EPA.

Soil/Fill Alternative 3 – Institutional Controls, Engineering Controls and NAPL Removal[17]

Capital Cost:	$11,140,405
Annual OM&M Cost:	$75,000
Present Worth Cost:	$10,450,900
Construction Time:	6-10 months

Soil/Fill Alternative 3 includes institutional controls (deed notices) and engineering controls (cover system) to contain and prevent direct contact with COCs, including lead. In addition, NAPL-impacted soil/fill would be removed from Lot 63 and the bulkhead would be reinforced or reconstructed, as appropriate, in order to minimize the potential for interaction between the Site and surface water, and to minimize soil erosion.

Deed notices would be recorded on all 15 lots~~,~~ or, for those lots on which deed notices have already been recorded, the existing deed notices would be revised to reflect RI results as well as the existing engineering controls. Use restrictions identified in the deed notices would ensure future use of the Site remains commercial or industrial and identify areas of the Site where contamination exceeds RDCSRS.[18] Fencing would be maintained and enhanced as appropriate to limit unauthorized access to the Site and use of the Site in a manner which may expose human receptors to unacceptable risk. Access restrictions could also include concrete barriers or guard rails. Other institutional controls include existing zoning and local ordinances that regulate use of the Site, which could be reviewed and modified as appropriate to ensure compliance with the objectives of this alternative. Institutional controls and access restrictions (to be determined during remedial design) would reflect the ongoing business operations at the Site.

NAPL-impacted soil/fill on Lot 63 would be excavated and disposed of off-site under this alternative. For cost estimating purposes, it is assumed that 311 CY would require disposal, based on the 1,200 square ft area and a depth of 7 ft bgs where NAPL-impacted soil/fill was observed during installation of a monitoring well. (NAPL in soil/fill adjacent to the USTs is addressed under the waste alternatives.) A pre-design investigation would be completed to further refine the extent of NAPL in soil/fill on the Lot 63 area. NJDEP guidance on NAPL-impacted soil/fill would be considered in determining the extent of soil excavation during remedial design and in documenting attainment of RAOs.

A site-wide engineered cap would consist of the construction of a barrier to prevent direct exposure of human and ecological receptors. The engineered cap would also control migration of contaminated soil/fill material from erosion. Capping as an engineering control is a typical component of a NJDEP remedy for historic fill that has been further impacted from current or historic discharge. Impermeable caps, such as asphalt or concrete caps, also address the soil-to-

[17] Soil/Fill Alternative 2 included institutional controls and NAPL removal but was screened out and not included in the Proposed Plan or this ROD because it did not meet ARARs and was not eligible for selection. The alternative numbering was maintained to be consistent with the FS.

[18] The Proposed Plan incorrectly referenced the non-residential standards (NRDCSRS). This has been clarified to state that the deed notices will identify areas of the Site where contamination exceeds New Jersey residential soil standards (RDCSRS).

groundwater pathway by reducing vertical infiltration. Existing building floor slabs in contact with soil/fill are incorporated into the cap. (If a building is demolished in the future and its floor slab removed, a new surface barrier could be warranted at that location.)

Existing pavement cover could be incorporated into the cap component of Alternative 3 if the existing pavement cover meets all cap design requirements. Current conditions at the Site are as follows: 1) an engineering control (concrete slab) has been established for portions of the building footprint on Lot 63, documented in a deed notice; and 2) asphalt pavement is the engineering control on Lots 68 and 70, documented in a deed notice. Other lots at the Site have concrete or asphalt surface pavement, although not documented as part of deed notices. During the remedial design, these surfaces would be inspected to determine whether they are suitable to be used as a cover. Some existing pavement may need to be repaired to function as an engineering control if the pavement otherwise meets the specifications of the cap design. The use of existing pavement as surface cap would reduce the amount of material resources, as encouraged under Region 2 Clean & Green Policy.

Where new cover material is required, the new pavement is assumed to be asphalt, but concrete would be acceptable as it provides the same protection of human health and environment as asphalt. Cracked and/or deteriorating asphalt, concrete, or building foundations would not meet minimum requirements for engineering controls EPA Exemption 5, Deliberative [redacted] will determine if existing surfaces achieve the RAOs.

Exemption 5, Deliberative [redacted]

Accordingly, this alternative would include a site-wide six-inch asphalt cap along with a 6-inch gravel subsurface over exterior unpaved portions of the Site to prevent direct exposure to soil/fill. In areas to be capped that have existing surface pavement, the thickness of new asphalt pavement could be adjusted to include the existing pavement, as long as the combined system of the existing and new cap would be protective of human health and the environment. The estimated extent of the asphalt cap is approximately 5.62 acres, some of which is currently covered by concrete or asphalt. (Note that the total area of the Site is 7.6 acres, and the area of the existing building is assumed to cover 1.98 acres, so the area anticipated to be capped is 5.62 acres.) Surface water management would also be evaluated during remedial design, to reduce potential off-site transport of soil/fill with COCs. Also, during remedial design, the use of different cover methods and material for different lots may be evaluated.

The existing bulkhead along the riverfront consists of various materials (steel, wood, concrete), and varies in condition from poor/failing to good, with the wood bulkhead sections generally in poor/failing condition and the steel and concrete sections generally in good condition. It is assumed that the wood sections would be replaced with new sheet piling tied into the adjacent steel and concrete sections of the wall. Additionally, steel sheeting would be installed along the river's edge on Lots 67 and 63 where a bulkhead is not currently present. Another option to address areas with poor/failing bulkhead or without a bulkhead that could be considered during the remedial design is shoreline revetment, which would require sloping the shoreline back (with possible building demolition) and placement of an impermeable liner and R-6 or larger riprap. A geotechnical investigation would be required for both bulkhead enhancement process options. Approximately 800 ft of new bulkhead walls would be constructed with an on-river operation (due to the limited space available on-site, assuming no building demolition). The deteriorating sections of bulkhead would be removed and properly disposed of.

Design and installation of bulkhead enhancement would incorporate active stormwater discharge pipes as appropriate, and existing inactive river wall pipes would be sealed. During the remedial design, the effective height of the bulkhead wall could be increased with soil/fill berms for surface water management; however, the cost estimate assumes that the bulkhead would be replaced/repaired to current site conditions. Bulkhead enhancement reduces the potential interaction between the Site and the Passaic River and minimizes soil erosion. This enhancement would also be compatible with the remedial action being designed in the lower 8.3 miles of the Lower Passaic River as part of the Diamond Alkali Superfund Site OU2 remedial design. Currently, the Diamond Alkali OU2 remedial design includes bank-to-bank sediment capping (with a chemical isolation layer) with dredging to accommodate the cap to prevent flooding. The installation of the shoreline revetment option would disturb less river sediment than the sheet pile wall. If the bulkhead repair, or shoreline revetment, occurs after the construction of the Diamond Alkali OU2 cap, and the OU2 cap is disturbed during construction by sheet pile placement or other shoreline revetments, the parties implementing the remedy at the Site would be responsible for working with EPA and/or the Diamond Alkali OU2 performing parties to address any impacts.

Soil/Fill Alternative 4 – Institutional Controls, Engineering Controls, Focused Removal with Off-Site Disposal of Lead, and NAPL Removal

Capital Cost:	$13,623,160
Annual OM&M Cost:	$75,000
Present Worth Cost:	$12,633,300
Construction Time:	8-12 months

Alternative 4 combines the institutional controls, engineering controls (capping with bulkhead replacement), and NAPL removal from Soil/Fill Alternative 3 with a focused excavation and off-site disposal of lead-impacted soil/fill in the vicinity of Building #7 (6,210 ppm in RI boring B-30, 8,690 ppm in RI boring B-75, and 10,800 ppm in historical boring HF-2). Alternative 4 focuses on lead removal (in soils above the water table) at concentrations above the lead RG of 800 mg/kg around Building #7, which is predominantly located on Lot 63 and Lot 64. The footprint for this component of this remedial alternative (approximately 0.5 acres) is based on single-point compliance with the RG, delineated using soil borings collected in the vicinity of Building #7. Delineation of the area would be confirmed during the remedial design. The focused excavation would be based on assessment during remedial design to achieve the lead RGs. The assessment would include consideration of RI soil/fill samples along with remedial design samples and/or confirmation samples if necessary. The excavated areas would be backfilled with fill material selected considering the NJDEP "Fill Material Guidance for SRP Sites" dated April 2015. To prevent soil erosion, the excavated area would be covered with gravel.

Removal of soil/fill would reduce and/or eliminate potential impact-to-groundwater sources, primarily localized lead. Because of the extent of soil/fill across the Site that contains COCs exceeding NRDCSRS, excavation under this alternative would not reduce the extent of capping needed. The remaining affected soil/fill, including lead elsewhere on the Site, would be addressed with a site-wide cap to minimize potential unacceptable human health risks/hazards or ecological risks as described in Alternative 3 (minus the 0.5 acres excavated for the focused lead removal and backfilled).

Excavation adjacent to existing buildings raises building stability considerations. Additional measures would be undertaken to address building stability, including sequential smaller excavation areas around the perimeter of the building. The structural integrity of the building would be evaluated in the remedial design following an engineering assessment.

Soil/Fill Alternative 5 – Institutional Controls, In-Situ Remediation, Engineering Controls, and NAPL Removal

Capital Cost:	$15,222,505
Annual OM&M Cost:	$68,750
Present Worth Cost:	$13,971,400
Construction Time:	8-12 months

Alternative 5 combines the institutional controls, engineering controls (capping with bulkhead replacement), and NAPL removal from Soil/Fill Alternative 3 with in-situ treatment to address lead along with other COCs that exceed the NRDCSRS. The footprint of this alternative is estimated to be 3.62 acres; but would be delineated during the remedial design. Because of the mixture of inorganic and organic contaminants on Site, an in-situ stabilization/solidification technology was assumed for cost-estimating purposes (instead of an in-situ treatment technology).

Stabilization/solidification would be the most viable type of in-situ treatment for this Site. This process would involve the injection and mixing of an appropriate binding agent (such as cement, lime, or kiln dust) using a backhoe or large-diameter auger. Alternatively, an amendment could be used to immobilize the metals. After completion of stabilization activities, the treated areas would be capped as described under Soil/Fill Alternative 3. Note that due to the increase in soil/fill volume inherent with this approach, along with the need to cap treated soils, it may be necessary to remove and properly dispose of the top 12 to 18 inches of soil/fill prior to treatment, so that the elevation of the final surface does not change. Treatability studies and/or pilot test(s) would be needed to determine the most effective binding agent and mixing ratio to treat Site soil/fill material.

Groundwater Alternatives

[redacted] Exemption 5, Deliberative, Attorney-Client

Groundwater Alternative 1 – No Action

Capital Cost:	$0
Annual OM&M Cost:	$0
Present Worth Cost:	$0
Construction Time:	0 month

Under this alternative, no action would be taken to reduce the potential for unacceptable exposures of humans to impacted groundwater or minimize further aquifer degradation. Existing NJDEP-approved institutional controls would remain intact although they are not enforceable by EPA. This alternative is retained for comparison with the other alternatives as required by the NCP.

Groundwater Alternative 2 – Institutional Controls, Site Containment at River Edge, and Pump and Treat

Capital Cost:	$30,590,844
Annual OM&M Cost:	$1,125,000
Present Worth Cost:	$34,258,600
Construction Time:	12-18 months

Alternative 2 includes institutional controls on the entire Site, a physical barrier (wall) constructed at the river edge and an active groundwater remedy to achieve RGs. Interaction with the existing CEAs and WRAs would be coordinated with NJDEP along with the property owners or other parties ~~responsible~~ for having recorded these controls. The CEAs provide notice that groundwater in the area does not meet designated use requirements, and the existing WRAs prohibit the installation and use of wells for potable and other uses within the designated area. During remedial design, groundwater samples would be collected, analyzed, and reported to update shallow and deep groundwater data. Updated results would be used for site-wide institutional controls and establishment of a site-wide CEA and WRA. Consistent with the requirements of New Jersey law, periodic monitoring and reporting to demonstrate compliance with the restrictions would be required as part of this alternative.

A vertical sheet pile barrier wall would be constructed along the river's edge as a means of reducing the potential for interaction between groundwater and the river. Sheet piling would be constructed to the top of an underlying confining layer, most likely the glacial lake bottom silt deposits, with a depth to be determined during remedial design. The barrier wall would have a total length of approximately 1,300 ft. The barrier wall is not intended to address geotechnical issues related to property redevelopment or to enhance the structural stability of the current bulkhead. A geotechnical investigation would occur during remedial design to determine wall alignment, depth and specifications.

Additionally, approximately 20 extraction wells would be installed throughout the Site to alleviate hydrostatic pressure behind the barrier wall and to extract both shallow and deep groundwater impacted by organics and shallow groundwater impacted by inorganics (such as lead). Extracted groundwater would be pumped to a new groundwater treatment facility, likely at least 5,000 to 7,500 square ft in floor area, to be constructed at an appropriate location on the Site.

The number of extraction wells, pumping rate, and individual processes to be utilized for treatment would be determined during the remedial design. For cost-estimating purposes, a 200-gallon per minute (GPM) system (i.e., 20 wells at 10 GPM per extraction well) including chemical oxidation, filtration, lead precipitation (chemical), and carbon polishing was assumed. Approval and/or necessary permits (if any) would be sought for discharge of treated water to the local Publicly Owned Treatment Works (POTW) or surface water.

This alternative's ability to achieve the RGs would be challenged by the on-going impacts of residual COCs in the soil/fill to the groundwater that would need to be treated; however, response actions undertaken for other media, including source control measures (i.e., UST removal and removal of elevated lead in the vicinity of Building #7), would remove potential groundwater sources, potentially allowing the pump and treat system to achieve RAOs faster.

[redacted]

Exemption 5, Deliberative, Attorney-Client

The ability to achieve RGs would also be challenged by the presence of historic fill in some areas of the Site, albeit historic fill that was likely impacted by Site operations.

Groundwater Alternative 3 – Institutional Controls and In-Situ Remediation

Capital Cost:	$28,459,770
Annual OM&M Cost:	$131,250
Present Worth Cost:	$20,844,800
Construction Time:	9-12 months (for initial round of injection)

Alternative 3 includes the institutional controls described for Groundwater Alternative 2. Additionally, impacted groundwater would be subject to in-situ remediation. The objective of this alternative is to reduce COC concentrations (organic and inorganic) in groundwater, eventually restoring groundwater quality.

The potential in-situ treatment methods could include in-situ chemical treatment, biosparging, and air sparging. Pilot- and bench-scale testing would be required as part of the remedial design to determine the most appropriate treatment approach and reagents for Site groundwater. However, tidal influences and geochemical conditions on in-situ treatment may limit effectiveness and may need to be assessed during the remedial design.

Many of the COCs are co-located or are in close proximity, which could lead to complications in that different, potentially incompatible treatment approaches might be required. Additional groundwater sampling and performance of treatability studies would be required as part of the remedial design to evaluate and select the most cost-effective means for addressing both organic and inorganic constituents in groundwater. This alternative does not eliminate the need for institutional controls or reduce their expected duration.

This alternative's ability to achieve the RGs would be challenged by the on-going impacts of residual COCs in the soil/fill to the groundwater that would need to be treated; however, response actions undertaken for other media that include source control measures (i.e., UST removal and removal of elevated lead in the vicinity of Building #7), would remove potential groundwater sources, potentially allowing in-situ remediation to achieve RAOs faster.

As with Groundwater Alternative 2, the ability to achieve RGs would also be challenged by the presence of historic fill in some areas of the Site, albeit historic fill that was likely impacted by Site operations.

Groundwater Alternative 4 – Institutional Controls, Pump and Treat, and Targeted Periodic In-Situ Remediation

Capital Cost:	$12,831,750
Annual OM&M Cost:	$1,500,000
Present Worth Cost:	$24,234,400
Construction Time:	8-10 months (not including periodic injections)

This alternative combines the institutional controls and the site-wide pump and treat system of Groundwater Alternative 2 (with no barrier wall), and the targeted, periodic in-situ treatment approach described in Groundwater Alternative 3 for upgradient portions of the Site.

As with Groundwater Alternative 2, the pumping wells near the river would be located to provide hydraulic containment at the river's edge to capture groundwater COCs at concentrations exceeding RGs. The groundwater level would be monitored, and the extraction rates would be variable, to provide maximum containment/capture without causing excessive induced infiltration from the river. The number of extraction wells, pumping rate, and individual processes to be utilized for treatment would be determined during the remedial design. For cost-estimating purposes, a 200-GPM system (i.e., 20 wells at 10 GPM per extraction well), including chemical oxidation, filtration, lead precipitation (chemical), and carbon polishing was assumed. The flow rate through the treatment system would be appropriately adjusted during periods of in-situ treatment to promote remediation. Approval and/or necessary permits, if any, would be sought for discharge of treated water to the local POTW or surface water.

As with Groundwater Alternative 3, the extent of groundwater to be addressed by periodic in-situ applications and the specific means for addressing it would be determined during the remedial design, which would include additional groundwater sampling and the performance of treatability studies. For cost estimating purposes, this alternative assumes targeted, periodic in-situ applications would occur annually during the first five years of operation. The effectiveness of the treatment would be evaluated and ~~it would be~~ modified, as needed, between each event. Under this hybrid approach, periodic in-situ remediation would be focused on the upgradient portion of the Site, targeting contaminated areas in both the shallow and deep groundwater. During the periodic injections, pumping at upgradient wells could be temporarily reduced or halted, as appropriate, to give the amendments adequate contact time with COCs in the groundwater. In any area where in-situ treatment did not achieve RGs, regardless of the location on-site, pump and treat would be relied upon to achieve the RAOs.

As with Groundwater Alternatives 3 and 4, the ability to achieve RGs would be challenged by the presence of historic fill in some areas of the Site, albeit historic fill that was likely impacted by Site operations.

COMPARATIVE ANALYSIS OF ALTERNATIVES

In selecting a remedy for a site, EPA considers the factors set forth in Section 121 of CERCLA 42 U.S.C. § 9621, and conducts a detailed analysis of the viable remedial alternatives pursuant to Section 300.430(e)(9) of the NCP, 40 C.F.R § 300.430(e)(9), EPA's Guidance for Conducting Remedial Investigations and Feasibility Studies (OSWER Directive 9355.3-01), and EPA's A Guide to Preparing Superfund Proposed Plans, Records of Decision, and Other Remedy Selection

Decision Documents (OSWER 9200.1-23.P). The detailed analysis consists of an assessment of the individual alternatives against each of the nine evaluation criteria at 40 C.F.R. § 300.430(e)(9)(iii) and a comparative analysis focusing upon the relative performance of each alternative against those criteria. The evaluation criteria are described below.

Threshold Criteria – The first two criteria are known as "threshold criteria" because they are the minimum requirements that each response measure must meet to be eligible for selection as a remedy.

- Overall protection of human health and the environment addresses whether a remedy provides adequate protection and describes how risks posed through each exposure pathway (based on a reasonable maximum exposure scenario) are eliminated, reduced, or controlled through treatment, engineering controls, or institutional controls.
- Compliance with ARARs addresses whether a remedy will meet all the applicable or relevant and appropriate requirements of other federal and state environmental statutes and requirements or provide grounds for invoking a waiver.

Primary Balancing Criteria – The next five criteria are known as "primary balancing criteria." These criteria are factors by which tradeoffs between response measures are assessed so that the best options will be chosen, given site-specific data and conditions.

- Long-term effectiveness and permanence refers to the ability of a remedy to maintain reliable protection of human health and the environment over time, once cleanup goals have been met. It also addresses the magnitude and effectiveness of the measures that may be required to manage the risk posed by treatment residuals and/or untreated wastes.
- Reduction of toxicity, mobility, or volume through treatment is the anticipated performance of the treatment technologies, with respect to these parameters, which a remedy may employ.
- Short-term effectiveness addresses the period needed to achieve protection and any adverse impacts on human health and the environment that may be posed during the construction and implementation period until cleanup goals are achieved.
- Implementability is the technical and administrative feasibility of a remedy, including the availability of materials and services needed to implement a particular option.
- Cost includes estimated capital, O&M, and present-worth costs.

Modifying Criteria – The final two evaluation criteria are called "modifying criteria" because new information or comments from the state or the community on the Proposed Plan may modify the preferred response measure or cause another response measure to be considered.

- State acceptance indicates if, based on its review of the FS Report and Proposed Plan, the State concurs with the preferred remedy.
- Community acceptance refers to the public's general response to the alternatives described in the FS Report and Proposed Plan.

The following is a comparative analysis of the alternatives for each medium, based upon the evaluation criteria noted above.

Waste Alternatives

Overall Protection of Human Health and the Environment
Waste Alternative 1 (no action) is not protective of human health and the environment because it does not prevent exposure to or reduce contamination. Accordingly, it will not be carried through the remaining criteria analyses.

Waste Alternative 2 (removal and off-site disposal) would provide protection of human health and the environment, as the wastes (and principal threat waste) would be removed from the Site, thereby eliminating the potential for exposure of human and ecological receptors and release of the materials to environmental media.

Compliance with ARARs
Waste Alternative 2 would be implemented in compliance with action-specific ARARs, such as the substantive requirements of New Jersey UST closure regulations and NJDEP Technical Requirements (N.J.A.C. 7:26E-5.1(e)) that apply to treatment or removal of free product.

Long-Term Effectiveness and Permanence
Waste Alternative 2 would achieve long-term effectiveness and permanence through the removal and off-site disposal of waste, including principal threat waste identified on Lot 64.

Reduction of TMV through Treatment
Toxicity, mobility or volume may be reduced through treatment in Waste Alternative 2 if material must be treated on-site to comply with the disposal requirements of the disposal facility.

Short-Term Effectiveness
Waste Alternative 2 would be implemented within one month, so any short-term impacts to workers, the surrounding community and the environment would be minimal. Impacts may include increased local traffic due to the commute of construction workers, transportation of construction equipment, shipment of waste containers, and importing of backfill materials.

Implementability
Removal of the wastes and USTs is readily implementable, as equipment and experienced vendors for this type of work are available along with backfill material and disposal facilities. However, work would be restricted to a certified contractor for the UST removal. All waste would need to be characterized and if required by the selected disposal facility, treated prior to disposal. The presence of subsurface utilities would need to be assessed prior to UST removal. Excavation to remove the USTs and NAPL-impacted soil/fill associated with the USTs on Lot 64 is anticipated to extend 13 feet bgs; groundwater in the excavation area will need to be managed during UST removal and saturated soil/fill would need to be dewatered prior to disposal.

Cost
The present worth cost for each of the Alternatives is:

Waste Alternative 1 - $0
Waste Alternative 2 - $1,580,700

Sewer Water Alternatives

<u>Overall Protection of Human Health and the Environment</u>
Sewer Alternative 1 (no action) is not protective of human health and the environment because it does not prevent exposure to or reduce contamination, nor does it meet chemical-specific ARARs. Accordingly, it will not be carried through the remaining criteria analyses.

Sewer Alternative 2 (removal and off-site disposal) would be protective because the sewer materials would be removed from the Site, thereby eliminating the potential exposure of humans and ecological receptors, release of contamination to the environment, or potential discharge of sewer water COCs to surface water.

<u>Compliance with ARARs</u>
Location- and action-specific ARARs would be met during implementation of Sewer Alternative 2.

<u>Long-Term Effectiveness and Permanence</u>
Sewer Alternative 2 would achieve long-term effectiveness and permanence through the removal and off-site disposal of the contents of the inactive sewer system. The magnitude of the residual risk/hazard would be minimal, and no material (aqueous or solid) requiring continuing controls would remain.

<u>Reduction of TMV through Treatment</u>
Toxicity, mobility or volume may be reduced in Sewer Alternative 2 if material is treated on-site to comply with the disposal requirements of the disposal facility.

<u>Short-Term Effectiveness</u>
Sewer Alternative 2 would be implemented in one and a half months, so any short-term impacts to workers, the surrounding community and environment will be minimal. Impacts may include increase local traffic due to the commute of construction workers, transportation of construction equipment, shipment of waste containers, and importing of backfill materials.

<u>Implementability</u>
Removal of the sewer materials and filling of the manhole and piping is readily implementable, as equipment and experienced vendors for this type of work are available. However, a specialized sewer contractor may be required. Solids removed from the sewer may need to be dewatered prior to disposal. Sewer water and solids would need to be characterized and if required by the selected disposal facility, treated prior to disposal.

<u>Cost</u>
The present worth cost for each of the Alternatives is:

Sewer Alternative 1 - $0
Sewer Alternative 2 - $24,900

Soil Gas Alternatives

<u>Overall Protection of Human Health and the Environment</u>
Soil Gas Alternative 1 (no action) is not protective of human health and the environment because it does not prevent exposure to or reduce contamination. Accordingly, it will not be carried through the remaining criteria analysis.

Soil Gas Alternatives 2 (institutional controls, air monitoring, and engineering controls) and 3 (in-situ treatment in lieu of air monitoring and engineering controls in existing buildings) would both be protective of human health, as potential risks/hazards associated with soil gas are directly addressed through air monitoring and engineering controls for both existing occupied buildings and future construction.

<u>Compliance with ARARs</u>
Soil Gas Alternatives 2 and 3 would comply with chemical-specific ARARs by requiring engineering controls (SSDS or vapor barrier) in new construction, and in existing buildings if assessments and monitoring identifies unacceptable risk, to achieve [redacted] –NJDEP's nonresidential Indoor Air Remediation Standards for the Vapor Intrusion Exposure Pathway for vapor intrusion concentrations,. ~~with engineering controls and deed notices.~~ Soil Gas Alternatives 2 and 3 would both comply with location- and action-specific ARARs for addressing potential vapor intrusion.~~,~~ [redacted] -

[redacted]

<u>Long-Term Effectiveness and Permanence</u>
Soil Gas Alternative 3 would have greater long-term effectiveness than Soil Gas Alternative 2, as Alternative 3 includes in-situ remediation to permanently remove contaminants above RGs from soil/fill within 100 feet of existing occupied buildings, whereas Alternative 2 includes no active remediation of contaminants and instead relies only on institutional and engineering controls (i.e., air monitoring and vapor barriers) to protect human health.

<u>Reduction of TMV through Treatment</u>
Soil Gas Alternative 3 would provide reduction of toxicity, mobility, or volume through in-situ treatment of TCE, total xylenes and naphthalene above RGs within 100 feet of existing occupied buildings.

<u>Short-Term Effectiveness</u>
Soil Gas Alternative 2 would have fewer short-term impacts to workers, the community and the environment than Soil Gas Alternative 3 because the activities are limited to the seven occupied on-site buildings where collection of vapor samples would take place, and, if needed, engineering controls would be implemented. These risks/hazards would be readily controlled by following appropriate health and safety practices. Alternative 3 would take 4 to 6 months to implement (including an initial round of injections).

Implementability
Soil Gas Alternatives 2 and 3 are implementable. Both would require the cooperation of the property owners and/or operators of the seven occupied buildings in order to conduct air monitoring and install and maintain compliance with engineering controls. As the implementation of institutional and engineering controls is the main component of Soil Gas Alternative 2, apart from potential challenges associated with imposing institutional and engineering controls, this alternative would be more easily implemented, with minimal disruption to ongoing activities, compared to Soil Gas Alternative 3, which also includes in-situ treatment. Alternative 3 would require treatability testing, and multiple applications may be necessary.

Cost
The present worth cost for each of the Alternatives is:

Soil Gas Alternative 1 - $0
Soil Gas Alternative 2 - $449,800
Soil Gas Alternative 3 - $4,050,800

Soil/Fill Alternatives

Overall Protection of Human Health and the Environment
Soil/Fill Alternative 1 (no action) is not protective of human health and the environment because it does not prevent exposure to or reduce contamination. Accordingly, it will not be carried through the remaining criteria analysis.

Soil/Fill Alternative 3 (cap and bulkhead enhancement), Soil/Fill Alternative 4 (focused excavation/disposal with capping and bulkhead enhancements) and Soil/Fill Alternative 5 (in-situ remediation with capping and bulkhead enhancement) would be protective of human health, as potential risks/hazards associated with direct contact of the soil/fill material would be addressed.

Compliance with ARARs
Soil/Fill Alternatives 3 through 5 would comply with chemical-specific ARARs by eliminating direct contact to concentrations exceeding NJ NRDCSRS with a site-wide cap and deed notices. Location- and action-specific ARARs would be met by Soil/Fill Alternatives 3 through 5. None of the alternatives eliminate the need for institutional controls.

Long-Term Effectiveness and Permanence
Soil/Fill Alternatives 3 through 5 would achieve long-term effectiveness and permanence by minimizing human and ecological exposure to soil/fill and preventing off-site transport of soil/fill containing COCs. Soil/Fill Alternative 4 would provide greater permanence than Alternative 3 because contaminated soil/fill would be excavated for off-site disposal in a licensed disposal facility. Similarly, under Alternative 5 in-situ treatment would permanently stabilize the contaminated soil/fill, making future exposure to the COCs less likely. Soil/Fill Alternatives 3 through 5 incorporate similar long-term O&M obligations through institutional controls, none anticipated to be less than the 30 years assumed for cost-estimating purposes.

Reduction of TMV through Treatment

Soil/Fill Alternative 5 would provide the greatest reduction of toxicity and mobility through treatment by stabilization/solidification of all COCs (organic and inorganic). However, the volume would not be reduced since contaminants are stabilized and solidified but remain on-site. Soil/Fill Alternative 4 would reduce mobility of COCs on-site, not through treatment but through removal and off-site disposal of elevated lead around Building #7, which also would remove co-located contaminants; however, toxicity and volume would only be reduced if material is treated prior to disposal. Soil/Fill Alternatives 3 through 5 include NAPL removal, which would reduce mobility of a principal threat waste, though not through treatment. The toxicity and volume may be reduced if material is treated to comply with disposal requirements at the off-site disposal facility.

Short-Term Effectiveness

Soil/Fill Alternatives 3 through 5 will all disrupt businesses to some extent, thus having a short-term impact on workers and potentially, the local community. The northern portion of the Site is extremely congested with ongoing business activities and also provides the only vehicle access point. The short-term impacts of Soil/Fill Alternatives 3 and 4 would be similar, as they are similar in scope. Soil/Fill Alternative 5 would cause the most short-term impacts because of the treatment areas in the northern portion of the Site which would cause significant disturbances to businesses as reagent delivery to the subsurface will require the use of large diameter augers and closely spaced injection points, due to the relatively shallow depth of impacts.

Implementability

Soil/Fill Alternatives 3 and 4 are both relatively implementable, though the excavation included in Soil/Fill Alternative 4 might be limited by proximity to buildings and underground utilities. Soil/Fill Alternative 5 would be the most technically challenging to implement because this alternative requires the use of specialized equipment and experienced vendors; pilot studies would be required to determine the appropriate reagent; and treatments may not be feasible due to underground utilities and closely spaced injection points due to the relatively shallow depth of impacts. Soil/Fill Alternatives 3 through 5 require engineering controls, including bulkhead enhancements. During construction of the bulkhead, if the engineered cap in the Lower Passaic River has been installed as part of the remedy of Diamond Alkali OU2, the parties implementing the remedy at the Site would be responsible to work with EPA and/or the parties performing work in the river to address any such impacts. Soil/Fill Alternatives 3 through 5 would require long-term maintenance in the form of site inspections to ensure compliance with institutional controls, verify inspection of fencing, and maintain integrity of the cap and bulkhead.

Cost

The present worth cost for each of the Alternatives is:

Soil/Fill Alternative 1 – $0
Soil/Fill Alternative 3 – $10,450,900
Soil/Fill Alternative 4 – $12,633,300
Soil/Fill Alternative 5 – $13,971,400

Groundwater Alternatives

The performance of all the active groundwater alternatives will be influenced by the on-going impacts of residual COCs in the soil/fill to the groundwater that will need to be treated. Response actions undertaken for other media that include source control measures (i.e., UST removal and NAPL-impacted soil/fill removal) would remove potential groundwater sources and capping or excavation of contaminated soil/fill could also reduce residual COC infiltration into groundwater from unsaturated soil/fill.

Overall Protection of Human Health and the Environment
Groundwater Alternative 1 (no action) is not protective of human health and the environment because it does not prevent exposure to or reduce contamination. Accordingly, it will not be carried through the remaining criteria analysis.

Groundwater Alternative 2 (containment at river edge and pump and treat), Groundwater Alternative 3 (in-situ remediation), and Groundwater Alternative 4 (pump and treat with targeted periodic in-situ remediation) would be protective of human health because all of these alternatives would restore the groundwater quality to meet the standards applicable for a Class IIA aquifer.

[redacted]
Exemption 5, Deliberative, Attorney-Client

Compliance with ARARs
Location- and action-specific ARARs would be met by Groundwater Alternatives 2, 3, and 4. In the short-term, Groundwater Alternatives 2, 3, and 4 would not comply with chemical-specific ARARs (NJ GWQS) associated with the restoration of groundwater; however, over time, the impacted groundwater are expected to eventually reduce COC concentrations to meet chemical-specific ARARs. The ability of all three alternatives to achieve ARARs would be challenged by the presence of residual COCs in the soil/fill, and by historic fill in some areas of the Site. Groundwater Alternative 4 will likely achieve chemical-specific ARAR before Groundwater Alternatives 2 and 3, because Alternative 4 includes both pump and treat technology and in-situ treatment, whereas Alternative 2 relies solely on pumping and treating, and Alternative 3, on in-situ treatment. Groundwater Alternative 3 may face challenges in meeting chemical specific ARARs because of the complex interaction between the in-situ treatments and the geochemistry of the aquifer. This would be true for Groundwater Alternative 4 as well; however, because the in-situ component of Groundwater Alternative 4 would be more targeted, the challenge would be lesser.

Long-Term Effectiveness and Permanence
Groundwater Alternatives 2, 3, and 4 all require long-term O&M through institutional controls and long-term groundwater monitoring to remain effective, until the NJ GWQS are attained. The O&M period for all four groundwater alternatives is anticipated to be at least the 30 years assumed for cost-estimating purposes, although it is possible that the source removal activities implemented to address the waste and soil/fill contamination may reduce the duration of O&M that is required.

Reduction of TMV through Treatment
Groundwater Alternatives 2 and 4 would effectively reduce the toxicity, mobility and volume of all COCs in the groundwater through use of a pump and treat system. Groundwater Alternatives 3 and 4 could reduce toxicity, mobility and volume of organic COCs depending on success of the reagent used for in-situ treatment; however, inorganic metals (including lead) are only precipitated

out of solution and cannot be destroyed, so for lead, only toxicity and mobility would be reduced through treatment.

Short-Term Effectiveness

Groundwater Alternatives 2 and 4 would be disruptive to business activities thus having a short-term impact on workers and potentially, the local community, as a result of the construction of a pump and treat system and associated well/piping network. The in-situ treatment activities associated with both Groundwater Alternatives 3 and 4 also lead to short-term impacts, but Alternative 3 would be more disruptive to business activities, workers and the local community than Groundwater Alternative 4 because multiple large-scale injections would be required. For Groundwater Alternative 4, in-situ treatments would be targeted periodic injections and generally at a smaller scale than Groundwater Alternative 3.

Implementability

Of the active groundwater alternatives, Groundwater Alternative 4 is the most implementable, while Groundwater Alternative 2 is the most challenging to implement because of the technical complexities of the construction of the barrier wall. The implementability challenges for Groundwater Alternative 3 are caused by the need to undertake multiple targeted rounds of in-situ injections. For Groundwater Alternatives 3 and 4, sampling and treatability studies would be required to evaluate how to address both organic and inorganic constituents in groundwater, taking into account tidal influences and geochemical conditions. The implementability of Groundwater Alternatives 2 and 4 is also affected by the need for access to a sufficiently sized portion of the Site property for construction of a groundwater treatment facility, which could lead to administrative challenges. Groundwater Alternatives 2 through 4 would each require site inspections to ensure compliance with institutional controls and operation and maintenance. Since Groundwater Alternative 4 is likely to achieve the RAO is the shortest time, there are fewer challenges associated with implementation.

Cost

The present worth cost for each of the Alternatives is:

Groundwater Alternative 1 – $0
Groundwater Alternative 2 – $34,258,600
Groundwater Alternative 3 – $20,844,800
Groundwater Alternative 4 – $24,234,400

State Acceptance

NJDEP concurs with EPA's selection of Waste Alternative 2, Sewer Water Alternative 2, Soil/Fill Alternative 4, and Groundwater Alternative 4. NJDEP does not concur with EPA's selection of Soil Gas Alternative 2. A letter of concurrence is attached in Appendix IV.

Exemption 5, Deliberative [redacted]

Community Acceptance

Comments received during the public comment period indicate that the public generally supports the selected remedy. These comments are summarized and addressed in the Responsiveness Summary, which is attached as Appendix V to this document.

PRINCIPAL THREAT WASTES

The NCP establishes an expectation that EPA will use treatment to address the principal threats posed by a site wherever practicable (NCP Section 300.430(a)(1)(iii)(A)). The "principal threat" concept is applied to the characterization of "source materials" at a Superfund site. A source material is material that includes or contains hazardous substances, pollutants, or contaminants that act as a reservoir for migration of contamination to groundwater, surface water, or air, or acts as a source for direct exposure. Contaminated groundwater generally is not considered to be a source material; however, LNAPLs in groundwater may be viewed as source material. Principal threat wastes are those source materials considered to be highly toxic or highly mobile that generally cannot be reliably contained or would present a significant risk to human health or the environment should exposure occur. The decision to treat these wastes is made on a site-specific basis through a detailed analysis of the alternatives using the nine remedy selection criteria. This analysis provides a basis for making a statutory finding that the remedy employs treatment as a principal element.

For this Site, LNAPL in the UST on Lot 64, LNAPL in Building #15A, and the NAPL-impacted soil/fill on Lot 63 and Lot 64 are considered to constitute a principal threat waste due to their mobility and potential impact to groundwater.

SELECTED REMEDY

The selected remedy addresses five media which include: waste material, sewer water, soil gas, soil/fill material, and groundwater. Lead was found to be the primary COC in soils at the Site. In addition to lead, copper, arsenic, PCBs, VOCs, and SVOCs were found to be of concern in soils. Lead, VOCs, and SVOCs were found to be contaminants of concern for groundwater. VOCs were found to be COCs for soil gas. VOCs were also found to be a contaminant of concern in the settled solids in an inactive sewer manhole. Non-aqueous phase liquid (NAPL) and various other wastes containing hazardous constituents were found across the Site. The various other wastes are currently contained; however, there is potential for contaminants to be released into the environment.

The major components of the selected remedy are:

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Waste Alternative 2 - Removal and Off-Site Disposal

- Removal and off-site disposal of the USTs, the aqueous and solid waste and/or LNAPL within the USTs, NAPL-impacted soil/fill material surrounding the USTs, the LNAPL in the pooled water in Building #15A, the white chalky talc-looking substance in a hopper in Building #7, a plastic 55-gallon drum in Building #12 containing liquid waste, and a five-gallon bucket in Building #17 containing solid waste. The LNAPLs in the UST and in Building #15A are considered principal threat wastes, and the removal and disposal of these wastes will address this concern.

- Following removal of USTs and their contents, confirmation sampling of soil/fill (including underneath the tank) and groundwater will occur.

Sewer Water Alternative 2 – Removal and Off-Site Disposal

- Transfer of the sewer water and solids from the inactive sewer line into appropriate containers or transport vehicles for off-site treatment and/or disposal.
- The associated sewer line and manhole will be cleaned, and then closed in place by plugging/filling to prevent future buildup of water and solids in the manhole.

Soil Gas Alternative 2 - Institutional Controls, Air Monitoring or Engineering Controls (existing occupied buildings), and Site-Wide Engineering Controls (future buildings)[19]

- ICs will be established in the form of deed notices site-wide to provide notice of certain restrictions upon the use of the property in relation to soil gas.[20] This requirement will be implemented in conjunction with the deed notice requirement for the soil/fill remedy.
- A building-specific assessment of sub-slab soil gas and/or indoor air quality will be required for any of the currently occupied existing buildings on the Site, and for existing buildings that will be occupied in the future, and, if the assessment identifies unacceptable risks/hazards, engineering controls will be implemented to protect the occupants of such existing buildings from unacceptable vapor intrusion risks/hazards. The assessment will evaluate vapor intrusion COCs in soil (TCE, total xylenes, and naphthalene), and for buildings within 100 feet of a groundwater well with VOCs that exceeded screening levels, additional COCs will be evaluated as part of the assessment (benzene, ethylbenzene, and vinyl chloride).
- Future new construction will be required to include a vapor barrier or other appropriate means of sealing the ground surface underneath the new building slab or installation of a ~~subsurface depressurization system (~~SSDS~~)~~, as determined by EPA.
- In all existing buildings – currently occupied and occupied in the future – periodic indoor air monitoring will be required to verify previous assessment results and to confirm that engineering controls continue to protect indoor workers, due to the potential for unacceptable risk from the presence of VOCs in indoor air above EPA ~~vapor intrusion screening levels (~~VISLs~~)~~. Air monitoring may also be required in newly constructed buildings. If indoor air monitoring indicates exceedances of EPA VISLs from Site COCs, further evaluation of the data would be needed to determine whether unacceptable risks/hazards exist in which case property owners or other parties would be required to implement further engineering controls to achieve New Jersey indoor air standards as remediation goals.

Soil/Fill Alternative 4: Institutional Controls, Engineering Controls, Focused Removal with Off-Site Disposal of Lead, and NAPL Removal[21]

- ICs will be established in the form of deed notices site-wide to provide notice that future

[19] Figure 14 in Appendix I is a schematic drawing that presents the Selected Remedy for Soil Gas. The details will be refined during the remedial design.
[20] Subsequent to issuance of the Proposed Plan, EPA concluded that a CEA/WRA would not add to the protectiveness of the soil gas remedy and did not include ~~removed~~ this component ~~from~~ in the remedy.
[21] Figure in Appendix I is a schematic drawing that presents the Selected Remedy for Soil/Fill. The details will be refined during the remedial design.

use of the Site must remain commercial or industrial and identify areas of the Site where contamination exceeds New Jersey residential soil standards.[22] These requirements will be implemented in conjunction with the deed notice requirement for the soil gas remedy.

- Fencing will be required to be maintained and enhanced as appropriate to limit unauthorized access to the Site and use of the Site in a manner inconsistent with the remedy.
- NAPL-impacted soil/fill on Lot 63 will be excavated and disposed of off-site.
- Contaminated soil/fill material will be capped, with a cap that consists of the construction of a barrier over the contaminated areas, to prevent access to and contact with the contaminated media and/or to control its migration.
- A focused excavation and off-site disposal of lead-impacted soil/fill around Building #7 of the Site where high levels of lead were found will be performed.
- The bulkhead will be reinforced or reconstructed, as appropriate, in order to minimize the potential for interaction between the Site and surface water, minimize soil erosion, and prevent off-site transport of soil/fill containing COCs and Contaminants of Potential Ecological Concern (COPECs).

Groundwater Alternative 4 – Institutional Controls, Pump and Treat, and Targeted Periodic In-Situ Remediation[23]

- ICs will be established in the form of CEAs/WRAs site-wide to provide notice that the groundwater in the area does not meet designated use requirements and to prohibit the installation and use of wells for potable and other uses within the designated area.
- Targeted, periodic in-situ remediation of the groundwater will be conducted. The specific means will be determined during the remedial design with treatability studies to determine the most appropriate treatment approach and reagents. Possible treatments include chemical treatment, biosparging, and air sparging.
- A pump and treat system will be installed to provide hydraulic containment at the river's edge to minimize migration of contaminated groundwater to the river. Extracted groundwater will be collected, treated, and disposed. The number of extraction wells, pumping rate, and individual processes to be utilized for treatment will be determined during the remedial design.
- Groundwater monitoring will be performed to demonstrate that the selected remedy continues to be protective of human health and the environment.

Summary of the Estimated Selected Remedy Costs

Cost includes estimated capital and annual O&M costs, as well as present worth cost. Present worth cost is the total cost of an alternative over time in terms of today's dollar value, assuming a seven percent discount rate. Cost estimates are expected to be accurate within a range of +50 to -30 percent. This is a standard assumption in accordance with EPA guidance.

[22] The Proposed Plan incorrectly referenced the non-residential standards (NRDCSRS). This has been clarified to state that the deed notices will identify areas of the Site where contamination exceeds New Jersey residential soil standards (RDCSRS).
[23] Figure 16 in Appendix I is a schematic drawing that presents the Selected Remedy for Groundwater. The details will be refined during the remedial design.

The estimated capital costs, O&M costs and present worth costs for the alternatives are discussed in detail in the FS Report. The cost estimates are based on the best available information. The present-worth costs for the five components (waste, sewer water, soil gas, soil, and groundwater) of the selected remedy is $38,923,100.

Cost estimates for the soil, sediment and groundwater components of the selected remedy are presented in Tables 12 through 16 of Appendix II. Individual cost estimates for each remedial alternative evaluated are provided in the FS Report.

Expected Outcomes of the Selected Remedy

The components of the selected remedy will actively address various wastes found across the Site, as well as the Site contaminants found in sewer water, soil gas, soil, and groundwater. The results of the human health risk assessment indicate unacceptable noncancer health hazards were found for metals, VOCs, and SVOCs in soil/fill. ~~Naphthalene,~~ TCE~~,~~ and total xylenes are soil/fill COCs with potential unacceptable risks/hazards associated with soil gas. In addition, several VOCs, SVOCs, and lead are groundwater COCs with unacceptable risks/hazards based on hypothetical potable use scenarios. Results of the ecological risk assessment found unacceptable risk to terrestrial or long-based species due to exposure to contaminated soil. The remedial action selected in this ROD will address the contaminated Site sewer water, soil gas, soils, and groundwater and, thereby, will ~~eliminate~~ mitigate the unacceptable risks associated with these exposure pathways, facilitate the commercial/industrial use of the Site property, and restore the groundwater to levels that meet state and federal standards.

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Commented [SJ81R80]: Maybe "eliminate the unacceptable risks"? or "resolve"?

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Green Remediation

Consistent with EPA Region 2's Clean and Green policy, EPA will evaluate the use of sustainable technologies and practices with respect to implementation of the selected remedy components.

STATUTORY DETERMINATIONS

EPA has determined that the selected remedy complies with the CERCLA and NCP provisions for remedy selection, meets the threshold criteria, and provides the best balance of tradeoffs among the alternatives with respect to the balancing and modifying criteria. These provisions require the selection of remedies that are protective of human health and the environment, comply with ARARs (or justify a waiver from such requirements), are cost effective, and utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. In addition, CERCLA includes a preference for remedies that employ treatment that permanently and significantly reduces the toxicity, mobility and volume of hazardous substances as a principal element (or justifies not satisfying the preference). The following sections discuss how the selected remedy meets these statutory requirements.

Protection of Human Health and the Environment

The selected remedy will protect human health and the environment because it will prevent human and ecological exposure to contaminated sewer water, soil gas, soil, and groundwater. The selected waste and sewer water remedies will remove these wastes, preventing an uncontrolled release. The selected soil gas remedy includes ICs and ECs to monitor or address potential vapor intrusion in buildings associated with soil gas contamination, which can be implemented in a short period and will be protective of human health. Any new construction would require ECs to prevent vapor intrusion. The selected soil/fill remedy will protect human health and the environment over the short and long term by removing the high-level lead contamination at the Site and capping the entire Site to prevent exposure to and migration of contaminated soils. Over the long term, the selected groundwater remedy will restore groundwater to levels that meet state and federal standards within a reasonable time frame. In addition, groundwater ICs will protect human health over both the short and long term by preventing groundwater use. This groundwater remedy would result in the reduction of exposure risk to levels within EPA's generally acceptable risk range of 10^{-4} to 10^{-6} for carcinogens and below a HI of 1.0 for noncarcinogens. Implementation of the selected remedy will not pose unacceptable short-term risks that cannot be controlled with standard engineering and health and safety best practices.

Compliance with ARARs

The selected remedy is expected to achieve the remediation goals for soil/fill COCs based on NJDEP's NRDCSRSs (chemical-specific ARARs),~~ and~~ for groundwater COCs based on NJDEP's GWQSs, and for soil gas COC~~'~~s based on NJDEP's indoor air remediation standards when ~~[triggered by unacceptable risk?]~~ ~~[~~engineering controls are triggered by a finding of unacceptable risk~~]~~ (chemical-specific ARARs). The remedy will also comply with location- and action-specific ARARs.

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A full list of the ARARs, TBCs, and other guidance related to implementation of the selected remedy is presented in Tables 17, 18 and 19 of Appendix II.

Cost Effectiveness

A cost-effective remedy is one whose costs are proportional to its overall effectiveness (40 C.F.R. § 300.430(f)(1)(ii)(D)). Overall effectiveness was evaluated by assessing three of the five balancing criteria in combination (long-term effectiveness and permanence; reduction in toxicity, mobility, and volume through treatment; and short-term effectiveness). Overall effectiveness was then compared to cost to determine cost-effectiveness.

Each of the alternatives underwent a detailed cost analysis. In that analysis, capital and annual O&M costs were estimated and used to develop present-worth costs. In the present-worth cost analysis, annual O&M costs were calculated for the estimated life of each alternative. The total estimated present worth cost for implementing the selected remedy is $38,923,100.

Based on the comparison of overall effectiveness to cost, the selected remedy meets the statutory requirement that Superfund remedies be cost effective (40 C.F.R. § 300.430(f)(1)(ii)(D)) and the relationship of the overall effectiveness of the selected remedy was determined to be proportional to costs and hence, the selected remedy represents a reasonable value for the money to be spent. The selected remedy is cost-effective as it has been determined to provide the greatest overall protectiveness for its present worth costs. See Tables 12 through 16 of Appendix II.

Utilization of Permanent Solutions and Alternative Treatment (or Resource Recovery) Technologies to Maximum Extent Practicable

The selected remedy complies with the statutory mandate to utilize permanent solutions, alternative treatment technologies, and resource recovery alternatives to the maximum extent practicable because it represents the maximum extent to which permanent solutions and treatment technologies can be utilized in a practicable manner to remediate the Site. The selected remedy satisfies the criteria for long-term effectiveness and permanence by permanently reducing the mass of contaminants in the Site wastes, sewer water, soils, and groundwater, thereby reducing the toxicity, mobility and volume of contamination.

Preference for Treatment as a Principal Element

By utilizing targeted, periodic in-situ treatment to the extent practicable to treat the groundwater contamination in combination with pump and treat to provide hydraulic containment, the Selected Remedy meets the statutory preference for remedies that employ treatment that reduces toxicity, mobility, or volume as a principal element is satisfied. Furthermore, excavation of soil/fill material would reduce the mobility of the lead around Building #7 and NAPL on Lot 63 through removal and appropriate off-site disposal. As required by the disposal facility, the toxicity and volume may be reduced if material is treated to comply with disposal requirements.

Five-Year Review Requirements

Because this remedy results in hazardous substances, pollutants, or contaminants remaining on the Site above levels that will allow for unlimited use and unrestricted exposure, a statutory review will be conducted within five years of the initiation of the remedial action to ensure that the remedy is, or will be, protective of human health and the environment, unless determined otherwise at the completion of the remedial action.

DOCUMENTATION OF SIGNIFICANT CHANGES

The Proposed Plan for Riverside Industrial Park Superfund Site was released to the public on July 22, 2020. EPA received extension requests, and the comment period closed on February 19, 2021.The Proposed Plan identified the following as the preferred alternatives for remediating the waste, sewer water, soil gas, soil, and groundwater, respectively, in the Site: Waste Alternative 2 – Removal and Off-Site Disposal; Sewer Water Alternative 2 – Removal and Off-Site Disposal; Soil Gas Alternative 2 – Institutional Controls, Air Monitoring or Engineering Controls (existing occupied buildings), and Site-Wide Engineering Controls (future buildings); Soil/Fill Alternative 4 – Institutional Controls, Engineering Controls, Focused Removal with Off-Site Disposal of Lead, and NAPL Removal; and Groundwater Alternative 4 – Institutional Controls, Pump and Treat, and Targeted Periodic In-Situ Remediation.

[redacted]
Exemption 5, Deliberative, Attorney-Client

remedy. The Proposed Plan stated ~~identified~~ in the description of the soil/fill alternatives that the institutional controls would include deed notices to provide notice that future use of the Site must remain commercial or industrial and identify areas of the Site where contamination exceeds New Jersey non-residential soil standards. This has been clarified to state that the deed notices will identify areas of the Site where contamination exceeds New Jersey residential soil standards.

[redacted]

Exemption 5, Deliberative, Attorney-Client

[redacted]

Exemption 5, Deliberative, Attorney-Client

Based upon review of the written and oral comments submitted during the public comment period, EPA determined that no significant changes to the remedy, as originally identified in the Proposed Plan, were necessary or appropriate.